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No. XVIII. OF VOL. I., 1941. LONDON, SATURDAY, MAY 3, 1941. Pp. 80—Price 1s.
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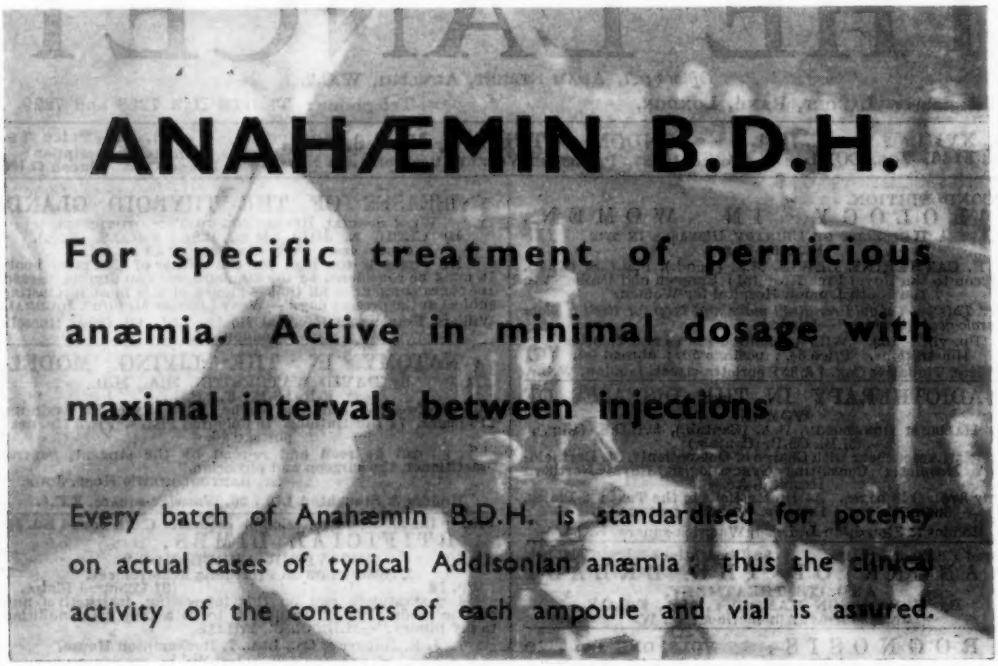

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No. 6140 LONDON: SATURDAY, MAY 3, 1941 CCXL

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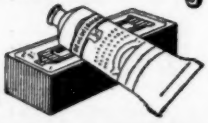

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SCIATICA

By J. H. Kellgren, M.B. Lond., F.R.C.S., M.R.C.P.

ASSISTANT IN THE SURGICAL UNIT AND DEPARTMENT OF CLINICAL RESEARCH, UNIVERSITY COLLEGE HOSPITAL, LONDON; SURGEON, E.M.S.

ALTHOUGH sciatica has been widely held to be synonymous with a disturbance of the sciatic nerve, it is in fact nothing more than a clinical syndrome of which the outstanding feature is deep pain and tenderness which has a striking distribution in the buttock and leg (figs. 1, 2, 3). Associated with this pain are usually a number of orthopædic signs and occasionally some neurological disturbances as follows.

ORTHOPÆDIC SIGNS	NEUROLOGICAL SIGNS
Postural deformity	Absent ankle-jerk
Limitation of back movements	Sensory changes
Limitation of hip movements	Motor paralysis
Wasting of leg	Sphincter disturbances

Combinations of the signs and symptoms result in a varied clinical picture, and it is not surprising that the cause of sciatica has been sought in a variety of existing and supposed pathological lesions around which controversy has raged. The orthopædic school pointed to the postural deformity and limitation of movements, claiming that the deep tenderness was situated in the muscles (Helweg 1925, Lange 1931), while the neurological school emphasised the absent ankle-jerk and sensory and motor disturbances, claiming that the tenderness was situated in the nerve trunks (Dejerine 1916, Lasegue 1864, Valliex 1847) but the arguments of neither side were conclusive. Then it was gradually realised (Cowan 1923, Putti 1927) that widespread pain in the leg might be referred from a localised lesion of the back or hips. This has now been confirmed by Steindler (1940), Luck (1938), (Kellgren 1939) and others who have shown that in about 70% of cases in which sciatica is diagnosed the symptoms and signs can be abolished by anæsthetising small ligamentous or muscular lesions which are usually situated in the region of the lumbosacral spine or hip. This referred pain has also been studied experimentally (Kellgren 1939) and it has been shown that the deep pain and deep tenderness in the leg follow a definite segmental pattern and that they can both be reproduced by stimulating ligamentous and muscular structures in the back. The orthopædic school is thus fully vindicated and it is now clear that in most patients suffering from so-called sciatica the pain is referred from a ligamentous or muscular lesion situated in the region of the hips or lumbosacral spine.

The neurological theory has also received confirmation. First it was found that in some cases of sciatica the cerebrospinal fluid showed an increased protein content (Sicard 1911), suggesting a disturbance of the spinal theca, and this has now been shown to result from pressure by a displaced portion of intervertebral disc (Barr 1937). The frequency of this lesion has not yet been ascertained, but it is undoubtedly quite common and probably accounts for most of the remaining cases of sciatica when those due to muscular and ligamentous lesions have been eliminated. The cases of pain in the leg resulting from sacro-iliac tuberculosis or involvement of the sacral nerves by malignant growth of the pelvis are both well recognised and will therefore not be considered here.

The cause of most cases of sciatica has thus been found in lesions of muscles, ligaments or intervertebral discs, but the diagnosis of the individual case is still a matter of great difficulty, and the purpose of this paper is to describe a simple form of clinical examination which facilitates diagnosis, and to summarise the findings from 70 patients in whom the diagnosis was established beyond doubt.

METHODS OF EXAMINATION

In the clinical diagnosis it is convenient to consider the orthopædic manifestations first and then to look for evidence of a neurological disturbance.

Ligamentous and muscular lesions.—The first point to consider is the distribution of the deep pain and tenderness. From experimental work (Kellgren 1939) we know that all deep-lying structures give rise to referred pain which is distributed over the segmental areas shown in fig. 1, while the superficial structures (such as the deep fascia and supraspinous ligaments) give rise to more local pain. The patient is therefore asked to map out roughly the distribution of his deep pain and tenderness (figs. 2 and 3) and this is then compared with the segmental areas, when it will be seen that the patient's pain corresponds with either a full segmental area (cases 1 and 2); a modified segmental area (case 3); a single segmental area plus a local component (case 4); or a combination of many segments (cases 5 and 6). From this information we can tell the segmental innervation of the source of pain and whether it is superficial or situated deeply in the trunk.

The movements of the knee, hip, sacro-iliac joints and lumbosacral spine are then examined in turn and a note made of any pain or limitation of range.* This procedure places the source of pain in one of these main regions: knee (case 3), hip (case 5), lumbosacral spine (cases 1, 2 and 4) or in multiple regions (case 6).

The appropriate region is then carefully palpated for a painful structure, and after this has been defined it is explored with a needle point, when the full spontaneous pain should be reproduced. The painful structure is then infiltrated with procaine, 2%, and in favourable cases the symptoms and signs may be completely abolished; more usually they are only greatly relieved, because it is rarely possible to anæsthetise deep-lying structures completely. In the lumbosacral region the palpating finger may fail to reveal a deep-seated painful structure such as an interspinous ligament or ligamentum flavum, but these can always be reached with the exploring needle.

By this simple method of investigation the source of pain can be established in most patients. In a few cases however there may be clear signs of a source of pain in the lumbosacral spine although the exploring needle fails to reveal any painful structure in the back. In such cases it is probable that the source of pain lies inside the spinal canal (cases 7, 8, 9, 10 and 11) and displacement of an intervertebral disc is to be suspected.

Displaced intervertebral disc.—Occasionally there may be clear signs of an intraspinal source of pain but no evidence of nerve involvement. In such cases the source of pain is probably the posterior common ligament (case 7). More often there is some evidence of pressure on a nerve root; thus an area of skin pain (Lewis 1938) may be added to the deep-pain area, and there may be sensory disturbances similar to those found by Lewis and Pochin (1938) in their recent studies on nerve paralysis by pressure and ischæmia. In these experiments they found that the sense of touch failed early, together with motor power, while pain failed later and delayed pain was not lost till the very end. They also observed that before the pain sense failed there was a period of hyperalgesia. Thus the earliest signs of nerve pressure will be periods of numbness, recovering with tingling but without detectable sensory loss (case 8). The next stage consists of hyperalgesia combined with loss of light touch (case 9), then loss of all sensation except delayed pain (case 10) and finally complete sensory loss (case 11). These sensory changes are distributed over the dermatome corresponding to the root or roots pressed upon (figs. 1 and 3) and they form the most reliable evidence of nerve involvement.†

* The knee and hip are tested in the usual way, and the sacro-iliac joints by compressing and distracting the iliac crests. The lumbosacral spine is examined as follows: flexion, side flexion and rotation are tested with the patient standing, the knees being straight to eliminate hip movement; in addition flexion is tested with the patient lying supine by raising each leg separately with the knee extended; finally, extension is tested with the patient lying prone.

† Occasionally patients with a simple ligamentous source of pain complain of widespread areas of numbness in which pin-prick feels less sharp, but there is no loss of touch or any other sensation (case 2). These areas are ill-defined and correspond roughly with the distribution of the referred deep pain and tenderness. They are easily distinguished from the sensory changes due to pressure on a nerve.

Muscular paralysis is only of value when it is severe, since muscle weakness and wasting are not uncommon in simple orthopædic cases.

The ankle-jerk is of more value but it may occasionally be absent in cases of simple referred pain distributed over the first sacral segment, and it is sometimes brisk in cases with obvious nerve involvement.

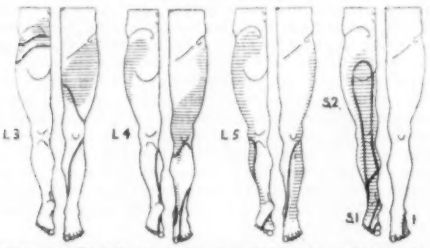

FIG. 1.—Distribution of segmental areas of deep pain and tenderness in leg (hatching) and limits of corresponding dermatomes (continuous line). (For the segmental areas in subjects with 4 or 6 lumbar vertebræ see Kellgren, J. H. *Clin. Sci.* 1939, **4**, 35.)

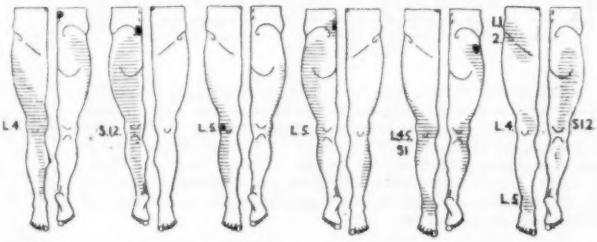

FIG. 2.—Distribution of deep pain and tenderness (hatching) and its point of origin (black) in 6 cases with a ligamentous or muscular source of pain.

Thus the full clinical picture of a displaced intervertebral disc consists of deep pain and tenderness in the leg with a full segmental distribution, together with some sensory disturbance in the distribution of the appropriate dermatome; in addition, there are the orthopædic signs of a source of pain in the lumbosacral spine but no demonstrable painful structure in the muscles or ligaments of the back. Such aids to diagnosis as the finding of a narrowed disc-space in the radiogram and an increase of protein in the cerebrospinal fluid are now well known. The level of the displacement can be deduced from the segmental areas involved if one remembers that it is always the root below the level of the displaced disc which is maximally affected. Thus if L4–5 disc is displaced, the fourth lumbar root escapes from the spinal canal above the protrusion while the fifth lumbar root passes directly over it and is maximally disturbed, though the sacral roots may also be involved if the prolapse is a large one. The intrathecal injection of Lipiodol is thus superfluous.

Other nervous diseases.—Very occasionally cases diagnosed as sciatica present clear evidence of nerve involvement but a complete absence of orthopædic signs, the movements of the limbs and back being quite free. This clinical picture may result from various nervous diseases (see table) which are not likely to be confused with displacement of an intervertebral disc.

Cases	Source of pain	X-ray findings	
50	Ligamentous and muscular lesions	Normal	28
		Narrow disc space	5
		Ankylosing spondylitis	5
		Secondary carcinoma (spine)	3
		Spondylolisthesis	2
		Unilateral sacralisation	1
		Osteoarthritis (hip)	2
		Old fracture (femur)	1
		Coxa vara	1
		Coxa valga	1
		Osteoarthritis (knee)	1
15	Displaced disc	Narrow disc space	15
5	Miscellaneous diseases—		
	Herpes zoster 2	Normal	5
	Intrathecal tumours 2		
	Polyneuritis 1		

Findings in 70 cases of so-called sciatica.

CASE-HISTORIES

CASE 1.—A theatrical agent of 46 who had suffered from right-sided sciatic pain for 3 weeks. For 20 years he had suffered from recurrent backache, and as a child he fell from a height on his bottom. Pain deep only. L4 in distribution; movements of knee, hip and sacro-iliac joints full and painless; back movements all limited, especially extension. Leg raising right 45°, left 55°; all movements limited by pain in leg (this places the source of pain in the lumbosacral spine). Pain in leg reproduced from a painful spot below and to right of L4 spine. Exploring needle showed this to be in region of interspinous ligament and ligamentum flavum. Procaine, 15 c.cm., injected in this region gave relief of pain and nearly full range of back movements. No sensory changes. Slight wasting of right thigh, right knee-jerk absent, left knee-jerk and both ankle-jerks brisk. Radiography showed narrowing of L4–5 disc.

CASE 2.—A labourer of 31 who had suffered from left-sided sciatica for a year. Pain deep only, S1–2 in distribution; movements of knee, hip and sacro-iliac joints full and painless; back extension full but flexion and side flexion limited by pain in leg. Leg raising, right 85°, left 35°; the source of pain is thus in the lumbosacral spine. Pain in leg reproduced from painful spot medial to left postero-superior iliac spine; with needle point this was localised to upper border of sacrum and the adjoining articular process; these structures were infiltrated with 20 c.cm. of procaine with complete relief of pain; leg raising now, right 85°, left 75°. Over the distribution of the deep pain there was an indefinite area of numbness in which pinprick felt less sharp, but there was no loss of sensation and this numbness disappeared immediately the source of pain was anæsthetised. No muscle wasting in leg; both ankle-jerks brisk. Radiography showed a normal lumbosacral spine.

CASE 3.—A lady of 64 who for 9 months had suffered from right-sided sciatica of gradual onset. Pain deep only, of modified L5 distribution centred over knee; movements of back, hips and sacro-iliac joints full and painless. Leg raising, right and left 130°; right knee flexion limited by 60°, extension by 5°; all movements give full pain in leg; the knee is thus the source of pain. Pain in leg reproduced from spot near upper and outer angle of patella. Procaine, 5 c.cm., injected in this region abolished the pain, but knee flexion was still limited by 30°. No sensory changes, some wasting of right thigh, both ankle-jerks present. Radiography showed moderate osteo-arthritis of both knees.

CASE 4.—A clerk of 41 who had suffered from left sciatica for 7 months; 6 years previously he injured his back in an accident. Pain deep only, L5 in distribution, plus a small local patch over lumbosacral junction; movements of knee, hip and sacro-iliac joints full and painless. Back: side flexion and rotation full but flexion and extension limited by pain in leg. Leg raising, right 75°, left 65°; the spine is thus the source of pain. Pressure below L5 spine gives local pain only, but needle inserted at this point gives full pain in leg from the interspinous ligament. Infiltration of these structures with 5 c.cm. of procaine gave relief of pain and a full range of back movements; leg raising, left and right 85°. No sensory changes or wasting in leg. Both ankle-jerks brisk. Radiography shows narrowing of L5–S1 disc.

CASE 5.—A greengrocer of 50 who had suffered from right sciatica for 4 weeks; 3 years previously he had had a similar attack lasting 3 months. Pain deep only, multi-segmental in distribution including L4–5 and S1; movements of knee, back and sacro-iliac joints full and painless. Leg raising, right and left 90°; right hip flexion and extension full but abduction, adduction and rotation limited and painful; the hip was therefore the source of pain. Pain in leg reproduced from painful spot in muscles just above right great trochanter. Infiltration of these muscles with 20 c.cm. of procaine gave complete relief of pain and a full range of hip movements. No sensory changes or muscle wasting, both ankle-jerks present. Radiography shows no abnormality of hip-joint.

CASE 6.—A soldier of 35 who had suffered from right sciatic pain for 3 weeks; 10 years previously he had been in bed for 3 months with pain and stiffness of the whole back and during the last 5 years he had suffered from weakness of his back. Pain deep only and multi-segmental, being present in the left leg as well as the right and also in the groin and scapular regions; knee movements full, hip flexion and rotation full but abduction and adduction painful and limited. Sacro-iliac joints painful; back very stiff, with only slight movement in the lumbar region and none in the thoracic. Leg raising, right 65°, left 55°. A number of painful spots were found at various levels in the back. The pain was thus arising from multiple lesions in the hips, spine and sacral iliac joints. No sensory changes, no muscular weakness or wasting, both ankle-jerks brisk. Radiography shows slight changes of ankylosing spondylitis.

CASE 7.—A housewife of 37 who had suffered from right sciatica for a year; 2 years previously she "felt something go" in her back while moving heavy furniture and since then had had pain in the midline of the back. Pain deep only, S1–2 in distribution plus local pain over lumbosacral junction. Movements of knee, hip and sacro-iliac joints normal; all back movements limited (especially flexion) by pain in leg. Leg raising, left 90°, right 25°. Palpation over lumbosacral junction gave local pain only and exploring needle failed to find any deep source of pain. Infiltration of the deep structures at this level with 20 c.cm. of procaine relieved the local pain, but left the pain in the leg and the other signs unchanged. No sensory disturbances. Some wasting of right leg, right ankle-jerk absent. Radiography showed narrowing of L5–S1 disc.

Laminectomy: theca and nerve-roots appeared normal but there was a tense bulging of the posterior common ligament

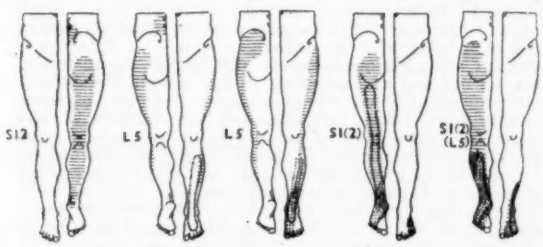

FIG. 3.—Distribution of deep pain and tenderness (hatching) and skin pain (dots) in 5 cases with displacement of an intervertebral disc. Limits of sensory changes are outlined: tingling by dotted line, hyperalgesia with loss of light touch by interrupted line, and complete anæsthesia by continuous line.

over the L5–S1 disc, and when this was incised a large piece of necrotic nuclear material escaped from beneath it. No return of pain after operation; 2 weeks later back movements full.

CASE 8.—A gardener of 37 who had suffered from recurrent attacks of backache and left-sided sciatica since he injured his back while lifting a barrow 5 years previously. Pain deep only, L5 in distribution with local component in midline of back. Tingling in distribution of L5 dermatome. Movements of knee, hip and sacro-iliac joints normal; back movements all slightly limited. Leg raising, right and left 65°. The exploring needle failed to find any painful structure in the region of the fifth lumbar vertebra and infiltration of these structures with 20 c.cm. of procaine only relieved the local pain, leaving the other signs unaltered. No sensory loss, but stroking of the skin in the region of L5 dermatome gave rise to tingling. Slight wasting of left buttock but no weakness of leg; both ankle-jerks brisk. Radiography showed narrowing of L4–5 disc.

Laminectomy showed thickening of dura which was firmly adherent to a knuckle of fibrous tissue protruding from L4–5 disc. No return of pain after operation; 2 weeks later back movements full.

CASE 9.—A stamp-dealer of 55 who had suffered from recurrent attacks of left-sided sciatica for 10 years. Deep pain of L5 distribution with skin pain in region of L5 dermatome. Movements of knee, hip and sacro-iliac joints normal, back movements all greatly limited by pain in leg and foot. Leg raising, right 50°, left 30°. Palpation and the exploring needle failed to find any painful structure in the back. Infiltration of the structures around the 5th lumbar vertebra with 20 c.cm. of procaine left the symptoms and signs unchanged. In the region of L5 dermatome there was an area of hyperalgesia combined with loss of light touch. General weakness and wasting of left leg. Left ankle-jerk slightly weaker than right. Radiography showed narrowing of L4–5 disc.

Laminectomy showed thickening of dura in region of L5 root which was displaced by a nodule of nuclear material which had escaped from the back of L4–5 disc. No return of pain after operation; 3 weeks later back movements full.

CASE 10.—An electrician of 33 years who had suffered from left-sided sciatica for 6 weeks; 9 years previously he had had a similar attack which lasted for 8 months. Deep pain of S1–2 distribution with skin pain in region of S1 dermatome; tingling in S2 dermatome. Movements of knee, hip and sacro-iliac joints normal. Back movements full except flexion which is greatly limited by pain in foot. Leg raising, right 90°, left 35°. Exploration of lumbosacral junction with needle found no source of pain, and infiltration of this region with procaine, 20 c.cm., left the symptoms and signs unchanged. In the region of S1 dermatome there was loss of touch and some hyperalgesia, the pain being delayed; in the distribution of S2 dermatome there was no sensory loss but all stimuli gave an increased response with tingling. There was weakness and wasting of the left leg and the left ankle-jerk was absent. Radiography showed narrowing of L5–S1 disc.

Laminectomy showed some thickening of the dura in the region of first sacral root, and a large fragment of disc substance was found lying free in the spinal canal behind L5–S1 disc. No return of pain after operation. All sensory changes gone on following day; 3 weeks later back movements full.

CASE 11.—An acrobatic dancer of 22 who had suffered from left sciatica for 6 months after a fall of 14 ft. in which she injured her back. Deep pain S1–2 in distribution with local component over lumbosacral junction; skin pain in region of S1 dermatome. Movements of knee, hip and sacro-iliac joints normal. Back movements limited, particularly flexion. Leg raising, right 130°, left 45°. Exploration of the lumbosacral junction revealed a source of pain in the interspinous ligament. After infiltration of this with 10 c.cm. of procaine there was some relief of pain and the back movements became somewhat freer. Wide area of complete anæsthesia including the whole first sacral dermatome, and an even larger area of loss of touch encroaching upon the dermatomes of L5 and S2. Delayed pain only could be obtained from 2nd and 3rd toes. Great weakness of all movements of the ankle and toes; left ankle-jerk present though weaker than right. Radiography showed narrowing of L5–S1 disc with spondylolysis of 5th lumbar vertebra.

Laminectomy showed considerable thickening of the dura and flattening of the nerve-roots which were firmly adherent to a mass of fibrous tissue which was attached to the back of L5–S1 disc. After operation the neurological signs recovered completely in 3 days, but 3 weeks later the back movements were still not full.

DISCUSSION

The findings in 70 patients suffering from so-called sciatica in which a definite diagnosis has been established are shown in the table. It will be noticed that ligamentous and muscular lesions form by far the commonest source of pain (50 cases) and that in only 22 of these did the radiogram reveal any change in the underlying bones and joints. Of the 15 cases with displacement of the intervertebral disc, 13 showed evidence of root pressure while in 2 there was none, the pain resulting from a disturbance of the posterior common ligament. The remaining 5 cases with nerve involvement resulted from miscellaneous nervous diseases, while in no case could the symptoms and signs be ascribed to an interstitial neuritis of the sciatic nerve, so that we are forced to conclude that this condition is rare, if indeed it exists at all.

Much interest has recently been shown in the disturbances produced by disruption of the intervertebral discs but the mechanism by which such symptoms are produced has remained obscure. The mechanical result of disruption of the nucleus pulposus is a narrowing of the intervertebral space with the production of a localised kyphosis (fig. 4). From our investigations it seems that this may give rise to a variety of clinical syndromes. The stretched supraspinous ligament may become painful, producing local pain in the midline of the back together with slight limitation of flexion and extension of the spine; then the interspinous ligament and ligamentum flavum may become painful, giving rise to deep pain of

segmental distribution together with great limitation of extension of the spine. Alternatively, the disrupted nucleus may be displaced backwards so that with each movement of flexion it distends the posterior common ligament; this gives rise to chronic pain of segmental distribution together with great limitation of flexion of the spine. Finally the disc substance may escape into the spinal canal and produce a disturbance of the theca and nerve-roots which may result in sensory and motor changes and an increase of protein in the cerebrospinal fluid.

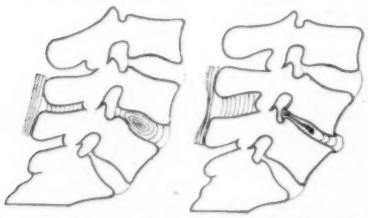

FIG. 4.—Schematic drawing of lumbosacral spine to show mechanical disturbances which may result from disruption of an intervertebral disc. On left is the normal spine, on right the disc between the 4th and 5th lumbar vertebræ has collapsed. It will be noted that the corresponding supraspinous and interspinous ligaments are greatly stretched, and that the necrotic nuclear material is distending the posterior common ligament.

So many forms of treatment have been advocated for so-called sciatica that one hesitates to discuss the subject. We have found, however, that most of the cases with simple ligamentous or muscular lesions recover rapidly with rest in bed combined with infiltration of the source of pain with novocain, though this infiltration may have to be repeated at weekly intervals. In chronic cases it may also be necessary to re-educate the muscles and joints by means of simple exercises. In the cases with displacement of an intervertebral disc, the present vogue is to remove the displaced portion by a limited laminectomy without opening the spinal theca. There is general agreement that the immediate results of this operation are satisfactory, but it has not been practised long enough for the late results to be assessed, and we know that such patients may recover with rest, at any rate for a number of years (case 10).

SUMMARY

A method of clinical examination is described by which an accurate diagnosis can be made in cases of so-called sciatica.

Out of 70 cases investigated by this method, 50 were found to be suffering from ligamentous or muscular lesions, 15 from displacement of an intervertebral disc and 5 from various neurological diseases, while in no case could the condition be ascribed to an interstitial neuritis of the sciatic nerve.

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"... to-day, there are the pure biologists, holding the academic posts, and the others, the applied biologists, holding posts ranging from research institutes to commercial firms. Research institutes may be attached to universities, but, even so, their staffs are often regarded as slightly tainted. The whole gamut of appointments from research institutes to industry is, of course, staffed by men and women trained in the universities. But, unfortunately, this is a one-way traffic system, and only in the rarest cases is there appointment of men from the applied side to the university staffs. . . . So . . the credo of academic men is accentuated that they are the fount and inspiration not only of all knowledge but also of all application . . . Occasionally, a mouse-like squeak of dissent arises, but the state of academic auto-hypnosis is little disturbed."—*Nature*, April 12, 1941, p. 428.

ABSORPTION OF ISO-AGGLUTININS FROM POOLED PLASMA OR SERUM

BY

B. L. DELLA VIDA, M.D. ROME
VOLUNTARY WORKER

S. C. DYKE, D.M. OXFD, F.R.C.P.
DIRECTOR

THE WOLVERHAMPTON AND DISTRICT EMERGENCY BLOOD TRANSFUSION SERVICE

(*From the Pathological Department, The Royal Hospital, Wolverhampton*)

WITHIN the last few months the value of human serum or plasma in the treatment of shock without exsanguination has become widely appreciated; large quantities of both and particularly of the latter are being collected and stored and much has already been given to casualties, generally with good results. Both plasma and serum have the obvious advantage over blood of being suitable for indefinite storage in readiness for immediate use. Both plasma and serum, however, contain the naturally occurring iso-agglutinins in a titre modified only by the degree of dilution to which the blood was subjected by the anticoagulant used at withdrawal. On theoretical grounds introduction of these iso-agglutinins into the circulation of subjects whose red cells are susceptible to their action would seem to be fraught with danger, and the larger the amount of serum or plasma infused the greater the danger.

All those concerned with the preparation of serum or plasma for infusion have been alive to this danger. In some blood-transfusion services attempts have been made to remove the iso-agglutinins by absorption with red cells of suitable agglutinogen content. This procedure presents various technical difficulties—for instance, the occurrence of hæmolysis in the mixed bloods and the difficulty of recovering the plasma from the mixture. Others have taken advantage of the absence of iso-agglutinins from blood of group AB and have used donors of this group as sources of plasma or serum for storage; but donors of group AB are rare and their blood when withdrawn is almost useless for transfusion purposes until the red cells have been removed. Other workers have aimed at the dilution of the iso-agglutinins by the pooling of plasma of various groups, usually A and B.

In practice no catastrophes have so far been reported as resulting from the infusion of theoretically incompatible serum or plasma, and there seems to be a growing tendency to disregard this possibility. That the infusion of theoretically incompatible plasma is capable of giving rise to trouble was demonstrated to one of us (S. C. D.) by a case in which a pint of plasma of group O was given to a patient of group A. The infusion was given rapidly and was followed immediately by symptoms of incompatibility in the shape of back pain, a sense of constriction of the chest and gasping respiration. These quickly subsided with adrenaline and morphia. This case did, however, seem to indicate that the iso-agglutinins cannot be altogether disregarded especially if large quantities of serum or plasma are to be given.

Few workers using pooled plasma for transfusion seem to have paid much attention to the iso-agglutinin titre of the final product. One of us (B. L. D. V.), while engaged on the filtration and bottling of pooled serum, observed that the titre of the iso-agglutinins in the final product was in many instances far below the original titre, even allowing for the dilution entailed by the pooling. This reduction of the iso-agglutinin titre was noted particularly in mixtures of sera A and B. The same phenomenon has also been noted and to some extent investigated by Levinson and Cronheim (1940), but they do not offer any explanation of it.

Searching for an explanation of this phenomenon we were reminded of the fact that the agglutinogens A and B are not confined to the red cells but are common to most of the tissues of the body, including the blood-plasma and serum (Schiff 1933). Serum or plasma A should then be capable of absorbing the anti-A iso-agglutinins, and serum or plasma B the anti-B iso-agglutinins. Examples from numerous observations on this point are given in the table.

Serum mixture	Red cells	Dilution of absorbed sera 1/2	1/4	1/8	1/16	1/32
A (3 c.cm.), B (3 c.cm.)	A	+	±	−	−	−
	B	−	−	−	−	−
A (3 c.cm.), B (1·5 c.cm.)	A	+	−	−	−	−
	B	−	−	−	−	−
A (3 c.cm.), B (1 c.cm.)	A	±	−	−	−	−
	B	−	−	−	−	−
A (3 c.cm.), B (0·75 c.cm.)	A	−	−	−	−	−
	B	−	−	−	−	−
A (3 c.cm.), B (0·5 c.cm.)	A	−	−	−	−	−
	B	−	−	−	−	−
Serum A (original titre)	A	−	−	−	−	−
	B	+ + +	+ + ±	+ ±	±	−
Serum B (original titre)	A	+ + ±	+ +	+ ±	±	−
	B	−	−	−	−	−
O (1 c.cm.), A (4 c.cm.), B (1 c.cm.)	A	−	−	−	−	−
	B	−	−	−	−	−
O (2 c.cm.), A (4 c.cm.), B (1 c.cm.)	A	±	−	−	−	−
	B	−	−	−	−	−
O (3 c.cm.), A (4 c.cm.), B (1 c.cm.)	A	+	±	−	−	−
	B	±	−	−	−	−
O (4 c.cm.), A (4 c.cm.), B (1 c.cm.)	A	+ ±	+	±	−	−
	B	+	±	−	−	−
O (4 c.cm.), A (4 c.cm.), B (2 c.cm.)	A	+ ±	+	±	−	−
	B	±	−	−	−	−
Serum O (original titre)	A	+ + +	+ + +	+ + +	+ + ±	+
	B	+ + +	+ + +	+ + ±	+	±
Serum A (original titre)	A	−	−	−	−	−
	B	+ + +	+ + ±	+ +	+ ±	±
Serum B (original titre)	A	+ + ±	+ +	+ ±	±	−
	B	−	−	−	−	−
O (3 c.cm.), A (4 c.cm.), B (2 c.cm.), AB (1 c.cm.)	A	+	±	−	−	−
	B	−	−	−	−	−
Serum AB (original titre)*	A	−	−	−	−	−
	B	−	−	−	−	−

* For original titres of O, A and B see above.

TECHNIQUE

The following technique has been used.

Plasma from citrated blood of the bank was separated from the red cells with sterile precautions, the fibrin was removed after addition of 8% solution of calcium chloride, 2 c.cm. for every 100 c.cm. of plasma (Clegg and Dible 1940), and the serum was passed through a Seitz bacterial filter. The sera to be absorbed were mixed in varying proportions in test-tubes and left at room temperature for at least 48 hours in order that absorption might be complete. Sterile precautions were observed, since it was found that contaminated sera were liable to develop non-specific agglutinins (Thomsen phenomenon). The mixtures of sera were tested for absorption of iso-agglutinins against fresh-washed red cells of groups A and B. Each sample of serum mixture was put up in a series of dilutions of from 1/2 to 1/32 in normal saline, as shown in the table, in test-tubes of 7 mm. diameter. Final readings were made after two hours standing at room temperature by transferring a small drop of the serum-red-cell mixture to a plain slide and reading under the low power (Landsteiner 1932). All sera previous to mixture were tested for iso-agglutinin titre; these readings are shown at the bottom of each section of the table.

DISCUSSION

Our observations lead us to believe that in sera A and B a high agglutinogen content runs with a high iso-agglutinin titre; such high titre sera are the most useful for purposes of absorption. Sera having a high agglutinogen content absorb the appropriate iso-agglutinins almost instantaneously at room temperature. If the agglutinogen content is low absorption may be complete only after some days of standing. A few experiments indicate that absorption is hastened by placing the mixed sera at 37° C. for a few hours.

Experiments have indicated that both the iso-agglutinin and agglutinogen content of individual sera vary within wide limits. On this account it is difficult to determine the generally optimal proportions for mixture for the purposes of absorption of the iso-agglutinins. Our results indicate that as a general rule the best proportions for cross absorption between sera A and B is between 4 and 5 parts of A to 1 of B. Serum AB, though sometimes containing large amounts of the two agglutinogens, is occasionally deficient in A (group A_2B). On this account it is alone not very reliable for the absorption of the agglutinins from O serum. In order to get, if not complete absorption, at least a considerable reduction of its agglutinin titre, serum O can conveniently be pooled with sera A and B in the proportions of 4 of A and 1 of B to 2 of O, or 1 of AB, 4 of A and 2 of B to 3 of O.

CONCLUSIONS

Agglutinogens A and B occur in the plasma and serum of blood as well as in the red cells. The use of red cells for absorption of iso-agglutinins from serum or plasma for transfusion purposes is therefore not necessary. The iso-agglutinins may be removed or their titre reduced to a low level by the admixture of serum or plasma of appropriate groups in suitable proportions.

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PEPTIC ULCER IN THE ROYAL NAVY

SYMPTOMS AND PATHOLOGY

BY

R. S. ALLISON, M.D. BELF., F.R.C.P.
A. ROBINSON THOMAS, B.CHIR. CAMB., D.M.R.E.
SURGEON COMMANDERS, R.N.V.R.

(*From a Royal Naval Auxiliary Hospital*)

THE significance of any disease in the fighting services depends on its capacity to cause unfitness for duty. The importance of gastric and duodenal ulcer in this respect has long been recognised in the Royal Navy. In 1931 Burdett reviewed the returns between 1911 and 1929, and commented on the growing frequency of the disease among sailors. He suggested that the cause might be the enormous diminution in physical effort which had been the outstanding change in naval life since 1911. In 1935 the report of the Medical-Director General on the health of the Navy states (p. 11): "Among diseases of the stomach, dyspepsia accounted for 104 cases with 4 invalidings, gastro-enteritis for 315 cases, and gastric ulcer for 97 cases with 10 invalidings and 5 deaths. . . . The most prolific cause of wastage"—i.e., among diseases of the digestive system—"was duodenal ulcer, which in 102 cases produced 31 invalidings and 3 deaths."

The expansion of the service since the outbreak of this war seems to have been accompanied by a disproportionate rise in the incidence of gastric and duodenal ulcer. Full statistics are not available, but at the moment it seems desirable to make a study of the war-time picture presented by the disease. This has already been done in the Army by Payne and Newman (1940), Willcox (1940), and Morris (1940). Some of the questions to which answers might be sought are:—

(1) In what way, if any, do the symptoms of war-time gastroduodenal dyspepsia differ from those seen in peace-time, and in civil life?

(2) What is the relative frequency of (*a*) simple ulceration; (*b*) complications, such as perforation, hæmatemesis, pyloric stenosis, and so on; and (*c*) neuromuscular secretory or functional disorders?

(3) When should dyspeptics be returned to duty or invalided as unfit for service?

It was with this object in view that the following work was done. A hundred sailors and marines formed the material for study. All were suspected of having ulcer, and the chief cause of their disability was pain in the

stomach after food. The individual case-records were taken personally.

SYMPTOMATOLOGY

A clear history of ulcer was given by almost all the patients; 93 had the typical remissions and 44 complained of night pain. In half the total the tendency to indigestion had been present for five years or more; in a fifth of them it went back as far as ten to twenty years; and in only 7 patients was it under a year. Thus 93% had had dyspepsia for more than a year, and this circumstance enabled us to contrast its outstanding features in the two periods, before and since the outbreak of war.

Pre-war period.—About one patient in three described a preliminary phase of atypical dyspepsia which had been noticed during adolescence, in the majority before entry to the service. These were usually men with the longest histories, and the early symptoms were either recurring "hungry" feelings with heartburn or flatulence, severe bouts of abdominal colic, or frequent "bilious attacks." The appendix was often removed at this stage and some patients were benefited, but in others the operation had no effect. Once the typical recurring attacks of pain after food had become established the patients could be graded, according to the severity of their pain and other features, into three principal types:

In the *first group* were 47 patients whose tendency to dyspepsia was slight. It was noticed for a few days or a week at a time and recurred only at long intervals—at the most two or three times a year. It was never severe enough to cause them to go sick or to stop work. Usually, when there was pain, they took an alkaline powder* and nearly all had relied on this to enable them to carry on. It was more popular than dieting, probably because it entailed less trouble. Only 9 men in this group dieted themselves during the attacks of pain.

CASE 9.—Able seaman, aged 31. First attack of indigestion occurred in 1934, while serving in the Mediterranean, after over-indulgence in alcohol. There was epigastric pain 2 hours after food, relieved by powder obtained from the sick bay. Since then has had recurring attacks of pain lasting a few days, but has never been off duty until May 29, 1940, when admitted to hospital.

The *second group* included 34 patients whose attacks of pain were more severe, more prolonged and more frequent. They had had to seek medical attention and make some modification in their diet and habits. In this group, 23 had been under treatment in naval and civilian hospitals at one time or another, and of these, 3 had had the appendix removed, 1 the gall-bladder, and another had had a gastro-enterostomy performed. Neither medical nor surgical treatment had resulted in complete cure, however, and as a result all but one had been keeping to a diet, avoiding certain foods, and taking alkali regularly, even when there was no pain. In this way they had managed to carry on, a few at sea in the Navy, others in the merchant service, the majority in civilian employment.

CASE 29.—Seaman, aged 38. Gave 12 years' history of recurring pain 1½ hours after food. In 1931 the attacks lasted 2–3 weeks and recurred 3–4 times a year. Treated in civil hospital. Laparotomy; no ulcer found, appendix removed. Kept well for a year, then pain recurred as before, but by careful dieting and taking alkali regularly has managed to keep reasonably well, living at home in civil life. Free from pain when entered service as a volunteer in January, 1940, but symptoms soon returned and were not relieved. Admitted to hospital Oct. 15, 1940.

The *third group* included those who had had acute complications before the war at some period in the history of their dyspepsia. There were 12 cases, 7 of perforation and 5 of hæmatemesis. Perforation was the first symptom of indigestion in 3 cases. Only 5 out of the 12 had been in the habit of dieting. The remainder, like the patients in the first group, contented themselves with taking alkali only when pain was troublesome.

CASE 66.—Stoker, aged 39. While serving in New Zealand in 1929 had a perforated duodenal ulcer, and gastro-enterostomy was performed. Since then had mild recurring attacks of pain every 3–4 months. In 1935 a more severe attack was treated medically in an R.N. hospital. Recently had pain at night and vomiting after meals. Admitted Dec. 6, 1939.

* Maclean's brand stomach powder was the favourite.

Since the outbreak of war.—Of the 93 patients who had had indigestion in peace-time, all considered that it had become worse since the outbreak of war. Since September, 1939, 16 had had complications—6 perforation, 5 melæna, 3 hæmatemesis, 1 pyloric stenosis, 1 gastro-colic-jejunal fistula. In 68 patients the pain was more severe and attacks had recurred more frequently. In the remaining 25, pain was said to be constantly present and no longer relieved by alkaline powder. Two other symptoms were very prevalent and contributed greatly to cause disability—loss of weight and vomiting. Half of the 93 patients had lost more than 7 lb. in weight and some as much as 2 stone. About the same number (43), complained of frequent vomiting, which occurred after meals, especially when pain was severe and a full meal had been eaten. Only 4 complained of the vomiting of large amounts of stomach contents. About a quarter of the 93 had been sent sick ashore and admitted to hospital on a previous occasion, some on two or even three occasions; each time the pain had yielded temporarily to rest and diet but had recurred shortly after taking up duty again.

CASE 3.—Able seaman, aged 26. At the age of 18–19 noticed spasms of severe "gripping" pain across the abdomen. The pain recurred every three months or so and was usually associated with constipation; there was no relation to food. Entered R.N. at 18. Appendicectomy at 20, and free of symptoms for 3 years. Then, at 23, had epigastric pain ½ hour after food which was relieved by alkali and dieting. Treated in R.N. hospital and recovered within 5 weeks. Returned to full diet and duty and kept free of symptoms until September, 1939, when pain recurred. It was the same as before except that food did not relieve it. Remained on duty, at sea in a destroyer, and took alkali regularly. On Nov. 24, 1939, perforation of ulcer on anterior wall of first part of duodenum; simple suture. Returned to barracks but within 4 weeks the pain recurred and has been present daily since then. Unrelieved by food or alkali. Lost ¾ stone in past 3 months. Admitted March 7, 1940.

Other symptoms and complaints.—Inquiry was made for other symptoms or diseases noticed since the onset of dyspepsia. Headache was complained of in 14 cases; insomnia in 3; fainting attacks like petit mal in 1; recurring attacks of urticaria in 1; asthma in 1; renal calculus in 2. While the occasional coincidence of one or other of these with dyspepsia is probably of no importance, the frequency of headache is noteworthy. Of the 14 men who mentioned it, in 4 the description was too vague to enable any conclusion to be drawn. In the remaining 10 it resembled migraine in character, periodicity and the associated visual disturbances.

CONDITION ON EXAMINATION

With 2 exceptions,† those patients who had been the victims of acute gastro-intestinal complications were convalescent on admission to hospital. In these, as in all other uncomplicated cases, examination of the heart, lungs, nervous system and urine was negative. There was no instance of gastric cancer or of signs pointing to disease of the gall-bladder or liver.

The *abdomen* was often tense, and the seat of diffuse or localised tenderness, especially in the epigastrium, but many patients who were afterwards shown to have ulcer had flaccid, non-tender abdominal muscles. It was not uncommon to find the pelvic colon loaded and contracted so that it formed a hardened mass in the left iliac fossa. Such patients usually had fæcal masses in the rectum.

Pallor, undernutrition and anxiety.—Many patients had a pallid complexion and were undernourished. Thin types predominated and it was exceptional to meet with corpulent or obese subjects (table I). The pallor was not due to anæmia. The mucous membranes and conjunctivæ were a healthy colour and routine blood

† One had a perforated duodenal ulcer and the other a gastro-jejuno-colic fistula. The latter (case 68), a petty officer, aged 38, had a severe hæmatemesis 5 years ago, after recurring attacks of epigastric pain. A duodenal ulcer was diagnosed and a gastro-enterostomy was done. He kept well until 1938 when the pain recurred. Since then has had attacks of increasing severity and frequency. Admitted on Jan. 4, 1940. For 6 months previously there had been steady loss of weight and bouts of vomiting every 3–4 days, the material being copious, excessively foul and fæcal in odour. A gastro-jejuno-colic fistula was diagnosed and its presence confirmed at operation. The fistula had arisen from a jejunal ulcer consequent on the gastro-enterostomy.

examination of 30 patients showed that the average red-cell count was 4,890,000, and the hæmoglobin 98%. The highest figures recorded were red cells, 6,250,000, and Hb. 115%; the lowest red cells, 4,110,000 and Hb. 73%. About one patient in every five (23 cases)

TABLE I—ACTUAL WEIGHTS OF 29 PATIENTS, COMPARED WITH AVERAGE WEIGHTS FOR HEIGHT AND AGE *

Case	Height (in.)	Age	Actual wt. (lb.)	Wt. per table (lb.)	Difference	Case	Height (in.)	Age	Actual wt. (lb.)	Wt. per table (lb.)	Difference
1	69	46	141	165	− 24	16	70	41	130	168	− 38
2	70	36	151	165	− 14	17	67	32	120	148	− 28
3	67½	26	140	146	− 6	18	67	31	137	148	− 11
4	63	39	127	135	− 8	19	65½	38	127½	142	− 14½
5	65	24	131	137	− 6	20	69½	30	142	158	− 16
6	72	32	141	172	− 31	21	63	25	113	131	− 18
7	64	32	115	136	− 21	22	67	34	150	148	+ 2
8	67½	36	116	150	− 34	23	66	38	133	146	− 13
9	63	31	112	133	− 21	25	70	40	152½	168	− 15½
10	68	37	140	155	− 15	26	69	30	153	158	− 5
11	64½	36	141	138	+ 3	27	69½	25	139	156	− 17
12	63	49	142	140	+ 2	28	72	38	158½	176	− 17½
13	67½	40	119	153	− 34	29	71½	38	160	170	− 10
14	70	37	136	165	− 29	30	67½	39	127	148	− 21
15	65	38	132	142	− 10						

* From "Personal Health Standard and Scale," by Thos. D. Wood, quoted by Mary S. Rose, "Foundations of Nutrition," New York, 1938.

showed anxiety to an obvious degree in their tense, watchful expression, furrowed or wrinkled brows, tremor of the limbs or in air swallowing. The three symptoms, pallor, undernutrition and anxiety, were often found together. The principal findings in this group are summarised in table II. It shows that the majority had typical ulcer pain, and that in about half the number, there was radiological evidence of ulcer.

TABLE II—FINDINGS IN PATIENTS SHOWING ANXIETY AND GASTRODUODENAL SYMPTOMS

Case	Aerophagy	Typical pain	Remissions	Night pain	Complications	X-ray findings
32	No	Yes	Yes	No	No	Duod. ulcer
33	No	Yes	Yes	No	Perf. 1930	Duod. ulcer
37	No	Yes	Yes	Yes	Perf. 1940	Normal
41	Yes	Yes	Yes	Yes	No	Normal
43	Yes	Yes	Yes	No	No	Normal
44	No	No	Yes	No	No	Duod. spasm
50	No	Yes	Yes	No	No	Normal
52	No	Yes	Yes	No	No	Normal
61	No	No	No	No	No	Duodenitis
72	Yes	Yes	No	No	No	Duod. ulcer
74	Yes	Yes	Yes	No	No	Aerophagy
81	No	Yes	Yes	No	No	Duod. ulcer
84	Yes	Yes	Yes	Yes	Perf. 1934	Duod. ulcer
87	No	Yes	Yes	No	No	Prob. gast. ulcer
89	Yes	Yes	Yes	No	No	Aerophagy
92	—	Yes	Yes	Yes	No	Prob. appendix
99	Yes	Yes	Yes	No	No	Aerophagy
4	No	Yes	Yes	Yes	No	Spasm and deform
13	No	No	Yes	Yes	No	Duod. ulcer
17	Yes	Yes	Yes	No	Perf. 1941	Duod. ulcer
18	Yes	Yes	Yes	Yes	No	Normal
25	No	Yes	Yes	Yes	Melæna 1940	Gastric ulcer

Ærophagy was a prominent feature in 9 cases but it was seen also in 10 others who were not notably nervous. Usually, it was readily detected on clinical examination but in some cases it was first revealed by radiography. It could not be said that its presence had much diagnostic value in favour of a purely emotional disturbance.

One man (case 17) who was admitted twice to hospital during the period under consideration, showed aerophagy, anxiety and typical ulcer symptoms on the first occasion. X-ray examination was negative. The aerophagy was stopped and he was given a full diet. The pain disappeared promptly, and he gained weight before returning to duty. Within 3 months, however, he returned with the anxiety and aerophagy as bad as ever. This time there was definite evidence of duodenal ulcer. He was treated medically and invalided as unfit for further naval service. He left hospital free of pain, but within a month of his return to civil life he perforated.

This experience was repeated in another instance (case 37) and served to emphasise the fact that, even with negative X-ray findings and obvious anxiety symptoms, typical pain should warn one of the imminence if not of the actual presence of ulcer, and of the possible complications connected with it. An anxiety state, however, seems to be a common finding in naval personnel suffering from gastroduodenal dyspepsia in war-time.

LABORATORY AND RADIOLOGICAL FINDINGS

Occult blood.—Only 17 out of the 84 patients tested ‡ gave positive fæcal results for occult blood. This low figure may partly be accounted for by the fact that the majority of the cases were received from another naval hospital where they had been some days or weeks in bed before transfer.

Fractional gastric analysis was done in 84 patients. In 54 cases, or about 64%, the curve of acidity was of the hyperchlorhydric type—either "climbing" or of the high sustained "plateau" type. In 22 it was within normal limits, in 4 there was subacidity, and in 4 more achlorhydria. This last finding was surprising, especially as all the patients concerned gave a typical ulcer history. Only 1 of the patients with subnormal acid, however, was shown to have an ulcer by X rays—case 25, a gastric ulcer.

CASE 25—Marine, aged 40. Recurring attacks of dyspepsia every 3–4 months lasting a week or so for 5 years. At first there was only discomfort and flatulence, but in 1937 began to get definite pain 1–1½ hours after food, often waking him at night between 1 and 2 A.M. Alkali powder invariably gave relief. Between attacks of pain felt perfectly well and could eat anything. During the attacks he took powder. Called up for war service on Oct. 6, 1939. Since then had suffered from almost continuous daily pain and lost weight. The day before admission he passed tarry black stools. Thin, pale, anxious appearance, Hb. 85%, red cells 4,630,000. Fæces: occult blood present. Vitamin-C deficiency. Fractional test-meal: achlorhydria with rapid emptying. X ray: gastric ulcer in upper part of pars media.

Radiological examination was done in 89 of the 100 cases. The other 11 had been X rayed before admission to hospital and the procedure was not repeated. The apparatus used was a self-rectifying ward unit fitted to a single type couch, necessitating an exposure of 2–2½ sec., using 10 mA at 65–75 kV. To change from screening to radiography everything but the mains had to be switched off and the apparatus readjusted. These factors made it difficult to adopt fully the technique of Berg (as introduced into this country by Mather Cordiner) in an endeavour to demonstrate an actual ulcer crater, and so other signs had to be taken into account, as follows:—

(1) Localised spasm leading usually to an incisura opposite the ulcer, and sometimes associated with a general spasm of the cap.

(2) Localised pain (not to be confused with discomfort in the abdominal wall caused by the prodding finger); pain is caused in the presence of an ulcer by pressure of the examining finger, probably because tension is increased in the œdematous tissue surrounding it.

(3) Persistent localised deformity from cicatricial changes in the first part of the duodenum; to be distinguished from deformities caused either by adhesions or by the pressure of viscera or tumours.

(4) Disturbances of gastric motility—i.e., hyperperistalsis with spasm of the duodenal cap in the early stages of ulceration, or delayed emptying in the later stages.

One of these signs appearing alone was not considered diagnostic of ulcer, but their combination was held to be strong presumptive evidence.

In a few cases the diagnosis of duodenitis has been put forward, sometimes with an ulcer and sometimes without, the criterion in these cases was spasm of the muscularis mucosæ with œdema of the mucosa itself (as evidenced by thick and rigid mucosal folds in the second and third parts of the duodenum), accompanied by failure to fragment the meal with consequent "pooling" of opaque material in the third part.

‡ Hb. free diet and Gregersen's modification of the Benzidine test. See Harrison, G. A., Chemical Methods in Clinical Medicine, London. 2nd ed., p. 477.

The radiological diagnoses made in the 89 cases examined were as follows:—

	No. of cases		No. of cases
Gastric ulcer	6	Duodenitis *	1
Prob. gastric ulcer	1	Chronic appendicitis	3
		Old gastro-enterostomy	2
Duodenal ulcer	34	Gastro-jejuno-colic fistula	1
Prob. duodenal ulcer	6	Aerophagy	7
Spasm of duodenal cap	9	No abnormality seen	19

* Duodenitis was also seen in 6 cases associated with duodenal ulceration.

Gastric or duodenal ulcers, whether certain or probable, were found, therefore, in 47 out of the 89 cases. Spasm of the duodenal cap or duodenitis was seen in 10, and altogether 63 cases, or 71% of the total, showed some pathological finding.

SUMMARY AND CONCLUSIONS

A review has been made of 100 sailors and marines who had symptoms of peptic ulcer. In almost all the symptoms were of long duration. In only 7% had they begun since the outbreak of war. In half the number they had been present, on and off, for five years or more, and in a fifth for ten to twenty years.

The dyspepsia was typical of peptic ulcer. The clinical picture differed, however, from that experienced in peace-time in the following respects:—

(*a*) The pain was usually more severe and it recurred at shorter intervals. It was often continuous and unrelieved by food or alkali.

(*b*) Attempts to carry on and eat ordinary food led to frequeat vomiting and great loss of weight. The most frequent accompaniments of undernutrition and continuous dyspepsia were pallor and anxiety.

(*c*) Acute gastro-intestinal complications were more common. In the whole period before the war, 12 of these patients had had complications: 7 perforation and 5 hæmatemesis. Between September, 1939, and January, 1940, 16 patients had complications: 6 perforation, 5 melæna, 3 hæmatemesis, 1 pyloric stenosis and 1 gastro-jejuno-colic fistula.

Radiological examination demonstrated a gastric or duodenal ulcer in about 45% of the cases, and a probable ulcer in a further 8%. This figure is undoubtedly an underestimate of the true frequency of ulcer in the series, attributable to the technical difficulties of a small X-ray set.

The disposal of service patients with symptoms of peptic ulcer is a difficult problem, and in most instances can be decided only after consideration of all the individual features of the case. If the presence of an ulcer is taken as the deciding factor about half of the cases will be invalided. But too much emphasis may have been laid on the importance of demonstrating an ulcer by X rays. If the history is not considered carefully a patient may wrongly be returned to duty because the X-ray findings are inconclusive and because his symptoms have been temporarily relieved by medical treatment. Many such cases recur and are ultimately invalided. History is a much more reliable guide to prognosis, and when pain is characteristic and has recurred over a long period there are strong grounds for invaliding. Obvious undernutrition in such patients is often useful confirmatory evidence where the X-ray findings are inconclusive. Hæmatemesis, severe melæna or perforation is also adequate justification for invaliding, even though the patient may recover fully and the ulcer be no longer demonstrable.

The majority of dyspeptics seen in hospital in the first year of the war were clearly chronic cases—men who had contrived to keep going in peace-time but had broken down in war. But the problem is changing and will change more as these men are gradually removed from the service and their place is taken by younger men who are likely to show more recent and less defined symptoms.

When cases of dyspepsia have done well under treatment, it has been the practice to return them to duty with a recommendation for a period of shore service, or service only in a ship carrying a medical officer. It remains to be seen whether their stay in hospital will enable them to carry on under active-service conditions in war-time. Some form of supervision is clearly necessary to ensure that they are followed up, and to consider the ætiological factors involved in bringing about possible future recurrences of their dyspepsia.

Acknowledgments are due to Surgeon Rear-Admiral F. J. Gowans for his permission to publish the records of these cases, which were under his care.

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PREVENTION OF EXPERIMENTAL FIBROIDS BY A CORTICAL HORMONE

BY

ALEXANDER LIPSCHÜTZ, M.D. DIRECTOR — LUIS VARGAS, JUN., M.D. ASSISTANT

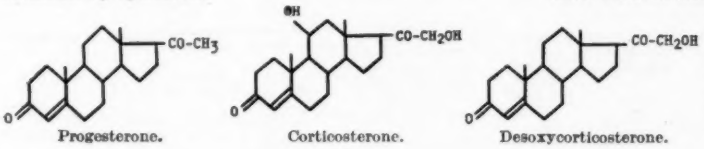
DEPARTMENT OF EXPERIMENTAL MEDICINE, NATIONAL HEALTH SERVICE OF THE REPUBLIC OF CHILE, SANTIAGO

EXPERIMENTAL uterine and extragenital abdominal fibroids produced by a prolonged administration of œstrogens can be prevented when testosterone propionate or progesterone is injected simultaneously with the œstrogen (Lipschütz, Vargas and Ruz 1939, Lipschütz, Murillo and Vargas 1939, Murillo 1940). Our first experiments were not numerous but were later extended on a larger scale, 31 animals receiving œstradiol and 52 receiving simultaneously œstradiol and testosterone, or œstradiol and progesterone (Lipschütz and Vargas 1941). Uterine fibroids were completely prevented by quantities of testosterone propionate fifty times greater than those of the esterified œstradiol simultaneously injected, or by quantities of progesterone a hundred and fifty times greater than those of the tumorigenic œstrogen. Uterine fibroids as produced by subcutaneous implantation of tablets of œstradiol were also completely prevented when tablets of progesterone were implanted simultaneously.

In these experiments with tablets, the average proportion between absorbed œstradiol and progesterone sufficient to prevent fibroids dropped as low as 1 : 13 (Lipschütz and Vargas 1941). The implantation of tablets under the skin by the technique of Deanesly and Parkes (1937, 1938; see also Warwick and Parkes 1940) proved in our experiments to be the most economical way of preventing the experimental production of fibroids by œstrogens.

Testosterone and progesterone are not entirely harmless to the human body, when given for a long time, the first on account of its masculinising action and the second on account of its action on the uterine mucosa. We thought that cortical hormones because of their chemical similarity to progesterone might also prevent experimental fibroids. Experimental findings indicate that the adrenals may exert an inhibiting action on the effects of œstrogens. Del Castillo and Calatroni (1930) reported that when œstrus is provoked in the castrated rat by continuous treatment with small doses of œstrogens, anœstrous periods appear again from time to time. Similar observations were also made by Zuckerman on the rhesus monkey (1937a) and on the rat (1938); he suggested that there is some relation between these cyclical changes and the adrenal cortex (Zuckerman 1937b). Di Paola (1939) showed that these anœstrous periods can be reduced in length when the adrenals are removed. One may therefore tentatively suggest that the adrenals produce a hormone or hormones which exert an inhibiting action on the effects of œstrogens. Progesterone, which is known to have such an inhibiting action (Courrier and Cohen-Solal 1937) is produced in the adrenals (Beall and Reichstein 1938, Beall 1940), but the anti-œstrogenic action of the adrenals may be due to some specific cortical hormones as well. Of the five active cortical hormones, desoxycorticosterone bears the greatest likeness to progesterone, as the brilliant work of Reichstein (1938) and others has shown (fig. 1, see Reichstein 1939). The absence of a hydroxyl group in position 11

in the formula of desoxycorticosterone explains why this hormone, unlike other cortical hormones, could be obtained by synthesis.



Progesterone. Corticosterone. Desoxycorticosterone.

FIG. 1

EXPERIMENTS WITH DESOXYCORTICOSTERONE

We thought it worth while to see whether synthetic desoxycorticosterone would prevent experimental fibroids, as progesterone and testosterone do. The acetic ester of synthetic desoxycorticosterone (called elsewhere in this paper "doca"), as prepared by Dr. K. Miescher, was used. Table I summarises the results obtained in 17 castrated female guineapigs in which tablets of œstradiol and tablets of doca were implanted simultaneously under the skin (œstradiol on the left side and doca on the right side). The results were compared with those in a control series of 20 animals which received tablets of œstradiol only. The behaviour of the genital tract in the two groups differed. The vagina opened three days after implantation of the tablet in the œstradiol group. The vagina opened also in the œstradiol-doca group but—with 2 exceptions—became closed again after about two weeks or more, and remained closed throughout the rest of the period of observation. Genital bleeding appeared in 6 out of 20 animals of the œstradiol group about a month after the beginning of treatment; it was never observed in the œstradiol-doca group even when the vagina remained open for a long time. In more than half of the animals of the œstradiol group ulceration of the labia became conspicuous at the beginning of the third week after implantation of the tablet; in no animal of the œstradiol-doca group was ulceration seen.

Autopsy was carried out 54–63 days after implantation of tablets. In the œstradiol group uterine and extragenital fibroids were well developed and the average total tumoral mark (Lipschütz and Vargas 1939a and 1939b) was 3; the average was attained or surpassed in 10 out of 20 animals in this group. But in the œstradiol-doca group no animal showed a reaction of more than 1·5 and the average was 0·5. Fig. 2 shows the maximal fibrous reaction in the œstradiol-doca group and fig. 3 the maximal reaction in the œstradiol group. Uterine tumours, sometimes of considerable size (fig. 4), were present in 15 out of 20 animals of the œstradiol group and there were no animals with uterine tumours in the œstradiol-doca group. The extragenital reaction of the œstradiol-doca group produced nothing more than a tumoral seed on the spleen, and rarely extended outside it except for some fibrous strands in the abdominal cavity; we find this kind of reaction to be characteristic of a low tumoral sensitivity.

There was also a remarkable difference in the uterine weights as shown in table I. The enormous development of the uterus as seen in the œstradiol group was—with one or two exceptions—inhibited in the other group by the presence of the doca tablet. There was purulent peritonitis with uterine localisation, due to the prolonged treatment with the œstrogen, in 3 out of the 20 animals of the œstradiol group; no animals of the œstradiol-doca group were affected in this way.

FIG. 4—Dorsal view of the uterus shown in fig. 3.

The influence of the cortical hormone on the development of the mammary glands and nipples was not inhibited as far as could be judged by the naked eye. Doca produced no masculinising effect on the clitoris.

DISCUSSION

These experiments show that the cortical hormone is capable of preventing completely the production of uterine fibroids and of reducing the extragenital tumoral reaction to a minimum; it is also likely to prevent uterine bleeding and other toxic effects of prolonged treatment with œstrogens.

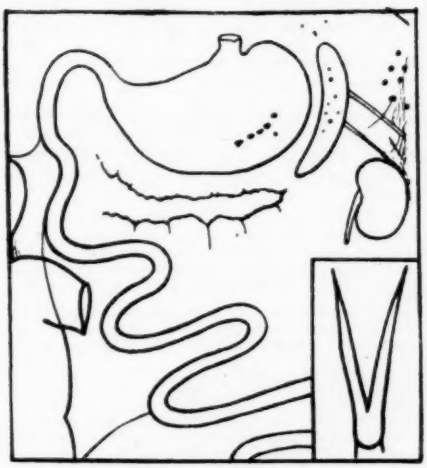


FIG. 2—Tumoral reaction induced by a subcutaneous tablet of œstradiol in the œstradiol-doca group. Maximal reaction in this series (total tumoral mark, 1·5). Small flat excrescences (tumoral seeds) on the spleen, stomach and abdominal wall on the left; fibrous strands here and there. Quantity absorbed: œstradiol 2·7 mg.; desoxycorticosterone 8 mg.

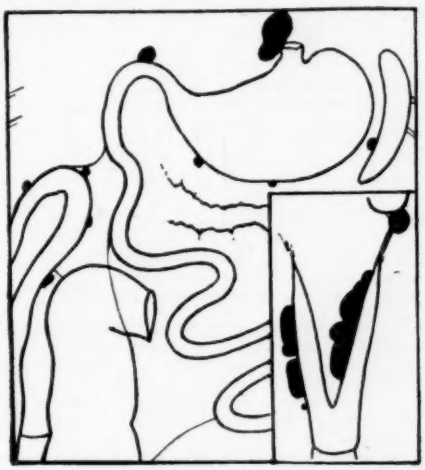


FIG. 3—Tumoral reaction induced by a subcutaneous tablet of œstradiol in the œstradiol group. Maximal reaction in this series (total tumoral mark, 9). Enormous parametrial tumours; an apical uterine tumour near the lower pole of the kidney; numerous tumours in the gastro-intestinal tract; tumour in the hilum of the spleen. Quantity of œstradiol absorbed: 3 mg.

TABLE I—RESULTS OF SUBCUTANEOUS IMPLANTATION OF TABLETS OF (1) ŒSTRADIOL AND (2) ŒSTRADIOL PLUS DOCA IN CASTRATED FEMALE GUINEAPIGS

Group	No. of guinea-pigs	Durn. of expt. (days)	Av. œstradiol absorbed (mg.)	Av. doca† absorbed (mg.)	Animals with tumoral uterine reactions	Animals with individual uterine or extrauterine tumoral marks not less than 1.	Total tumoral mark (fibroids and fibrosis)		Weight of uterus (g.)	
							Av.	Min. and Max.	Av.	Min. and Max.
I. Œstradiol	20	54–62	3 (2·2–4·1)	0	15	14	3 ± 0·54	0·5–9	3·44‡ ± 0·34§	2·1–5·7
II. Œstradiol and doca	17	55–63	2·5 (1·1*–4)	7·72 (6·9–9·9)	0	1	0·5 ± 0·11	0–1·5	1·94 ± 0·16	1–3·3

* One animal absorbed 0·6 mg. only.

† Calculated for desoxycorticosterone, not for the acetic ester (1 mg. of desoxycorticosterone when esterified with acetic acid weighs 1·13 mg.). One animal absorbed 3·4 mg. only.

‡ Only 13 animals ; the remaining 7 mostly had very large uteri and tumours.

§ $\Sigma = \sqrt{\frac{\Sigma d^2}{n(n-1)}}$, according to Burn (1937).

One objection to these conclusions may be raised : absorption of œstradiol was somewhat greater in the œstradiol group (3 mg.) as against 2·5 mg. in the œstradiol-doca group. Absorption, too, was more uniform in the œstradiol group, varying between 2·2 and 4·1 mg., whereas in the œstradiol-doca group the quantity absorbed varied between 1·1 and 4 mg. ; the difference is not significant and does not indicate that absorption of œstradiol was diminished by the action of the cortical hormone. Nor can it be objected that our conclusions are based on a casual lesser absorption of the tumorigenic œstrogen in the œstradiol-doca group, because only those experiments are compared in which absorption of œstradiol was equal and uniform in both groups (table II). The comparison clearly shows the preventive action of the cortical hormone.

Our results also show the low relation between the quantity of absorbed œstradiol and the quantity of absorbed cortical hormone. When all experiments are considered (table I) the relation is 1 : 3·1 (as calculated for desoxycorticosterone and not for the acetic ester).

TABLE II—UTERINE WEIGHTS AND TUMORAL MARK FOUND AT AUTOPSY IN THE TWO GROUPS OF GUINEAPIGS

Œstradiol group					Œstradiol-doca group					
Guineapigs	Duration (days)	Œstradiol absorbed (mg.).	Uterine weight (g.)	Tumoral mark	Guineapigs	Duration (days)	Œstradiol absorbed (mg.)	Desoxycorticosterone absorbed (mg.)‡	Uterine weight (g.)	Tumoral mark
1	54	3·9	3·3	2·5	1	55	4	6·9	1·1	1
2	54	4	7·2*	7·5	2	57	3·5	7·7	1	0·5
3	55	3·4	..†	4·5	3	57	3·5	7·5	2·1	0·5
4	55	3·3	2·4	1	4	57	3·7	9·9	2	0·5
5	55	3·2	3·3	0·5	5	62	4	9·2	3	0
6	55	3·2	5·8*	3·5	6	63	3·3	8·2	2·3	0·5
7	60	3·5	5·7	5	..	..	..	..	..	..
8	60	4·1	3·1	2	..	..	..	..	..	..
9	62	3·6	3·3	1	..	..	..	..	..	..
10	62	3	..†	9	..	..	..	..	..	..
Average		3·5	3·5	3·6	..	..	3·6	8·2	1·9	0·5

* With tumours (omitted in the average).

† Not weighed on account of large tumours.

‡ Calculated for desoxycorticosterone, not for the acetate.

When only those experiments are considered in which there was a good absorption of œstradiol (table II) the relation between the quantities of absorbed œstradiol and desoxycorticosterone is 1 : 2·3. A quantity of desoxycorticosterone about three times that of œstradiol is sufficient to prevent the tumorigenic and some other toxic actions of the latter. The synthetic cortical hormone used is probably superior, in this respect, to the synthetic progesterone and testosterone propionate used in our former experiments, though no quantitative details can be given at present. We have also tried tablets of different esters of testosterone and other synthetic androgens, such as dihydrotestosterone and androstandiol prepared by Dr. K. Miescher ; the results will be given in a later paper.

We have not yet examined the uterine mucosa microscopically, but it seems probable that here also we shall find evidence of a preventive and protective action of the cortical hormone, confirming the work of Korenchewsky (Korenchewsky and Hall 1937) on the effects of progesterone in the rat, and our own former work (Lipschütz, Vargas and Ruz 1939) on testosterone in the guineapig.

SUMMARY

Tablets of the acetic ester of desoxycorticosterone, a synthetic cortical hormone, when introduced under the skin simultaneously with a tumorigenic tablet of œstradiol, are able to prevent the tumorigenic and some other toxic effects of the prolonged absorption of the œstrogen.

Uterine fibroids were completely prevented ; extragenital fibroids were reduced to a minimum.

Extreme development of the uterus and uterine bleeding, which may be expected after prolonged absorption of œstradiol, were also inhibited by the presence of desoxycorticosterone.

The amount of desoxycorticosterone necessary to inhibit the tumorigenic action of œstradiol is only about three times the amount of the latter when subcutaneous tablets are used. In its tumour-preventing action desoxycorticosterone seems to be superior to testosterone and progesterone, though no quantitative comparison can be made as yet.

This investigation has been aided by grants from the Jane Coffin Childs memorial fund for medical research of Yale University, from the Ella Sachs Plotz foundation for the advancement of scientific investigation, from Mr. Adolfo Eastman (Limache, Chile), and by special government funds for research work, by courtesy of the Chilean Minister of Health.

Thanks are due to Dr. K. Miescher of Messrs. Ciba in Basle for supplying œstradiol and synthetic desoxycorticosterone, and to Dr. C. Nuñez and Mrs. Violeta de Kaplan for technical help. Mr. Reynaldo Vargas kindly checked all statistical calculations.

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COMPOSITION OF DIPHTHERIA ANTITOXIC SERA

BY

R. A. KEKWICK, M.SC. LOND. — M. G. MACFARLANE, PH.D. LOND.

B. C. J. G. KNIGHT, D.SC. LOND. — B. R. RECORD, PH.D. BIRM.

(From the Lister Institute of Preventive Medicine)

IT is the purpose of this note to draw attention to some new facts concerning the composition of diphtheria antitoxic sera, which may have a bearing on their therapeutic efficiency.

It has been usual in the concentration of diphtheria antitoxic serum by salting-out methods to separate first a less soluble fraction (the euglobulin fraction) of low antitoxic activity, and then to precipitate a second fraction—pseudoglobulin—by further addition of the precipitating salt. This pseudoglobulin fraction of the serum proteins contains the bulk of the antitoxin units. It is now known that the total globulin fraction of the serum consists of three components, α, β and γ globulins, of similar molecular weight but different electrophoretic mobilities. Both the pseudoglobulin and euglobulin fractions of the ordinary salting-out procedure are mixtures, the former being predominantly composed of α and β globulins, while the euglobulin contains a relatively large proportion of γ globulin and some β globulin. Pappenheimer and others [1] have separated from the pseudoglobulin fraction of diphtheria antitoxic horse serum a physically homogeneous globulin, of which nearly 50% was specifically precipitated by diphtheria toxin.

A detailed examination of the three globulin components isolated by the electrophoretic method from diphtheria antitoxic horse serum has been made by two of us.[2] It has been found that, while the α component has no detectable antitoxic activity, both the β and the γ components are antitoxic, the sum of the separate activities accounting satisfactorily for the total activity of the serum. Both these proteins are specific antibodies to the classical diphtheria toxin prepared by the use of a Park-Williams 8 strain, in that they neutralise this toxin in the usual animal test for potency (L+) and flocculate with the toxin in a balanced mixture (Lf). There are, however, striking differences between the two antitoxins—in the flocculation time, the in-vivo/in-vitro ratio (L+/Lf), and the empirical composition of the floccules, as follows:

	$Kf_{7\cdot5}$ minutes	In-vivo/in-vitro ratio $\left(\frac{L+}{Lf}\right)$	Floccule composition.
β globulin ..	147 ..	0·9 ..	.. $(TA_2)n$
γ globulin ..	7 ..	2·0 ..	.. $(TA_4)n$

$Kf_{7\cdot5}$ = Flocculation time at 7·5 Lf /ml. level.
T = One molecule of toxin.
A = One molecule of antitoxin.

Examination of the relative and absolute amounts of β and γ antitoxins in a number of horse sera during the routine course of immunisation with diphtheria toxoid showed that initially the amount of γ antitoxin increased more rapidly than the β antitoxin but soon reached a steady value. The β antitoxin, however, rose more slowly to a much higher maximum value and thus contributed the major proportion of the total unitage finally obtained. In a series of bleedings from a single horse the in-vivo/in-vitro ratio decreased, and the flocculation time, which afforded a useful indication of the relative amounts of β and γ antitoxin, increased pari passu with the proportion of β antitoxin.

The γ antitoxin precipitates at lower salt concentrations than the β antitoxin, and in serum concentration by salting-out methods tends to be separated in the euglobulin fraction, which is removed, while the bulk of the total antitoxin units is obtained in the pseudoglobulin fraction, the antitoxic activity of which is predominantly due to β antitoxin. It has been noted by Glenny and his co-workers [3] that "avid" sera commonly give rapid flocculation, and that in fractional precipitation with increasing amounts of ammonium sulphate the earlier fractions have a higher in-vivo/in-vitro ratio, and are more "avid" than the later fractions. The avidity was gauged by the dissociation of the toxin-antitoxin complex on dilution. It seems probable that these observations may be correlated with the relative proportion of γ antitoxin in different sera and in the various fractions precipitated with ammonium sulphate.

In the recently introduced process of serum concentration by the use of pepsin,[4] the product, containing on an average 80% or less of the total antitoxic activity of the serum, has a rather short flocculation time, approaching that of the γ antitoxin, but the in-vivo/in-vitro ratio of this antitoxin is approximately unity, and the protein is most probably derived from β globulin. The rapid flocculation per se of an antitoxin therefore is not necessarily an indication of γ antitoxin, though, as remarked above, in unconcentrated sera the flocculation time is a useful indication of the proportion of γ antitoxin.

In investigations of the pepsin-concentration process we have obtained poor yields of antitoxin from fast flocculating sera, and from a fraction containing a high proportion of γ globulin only 15–20% of the antitoxic activity was recovered. Early bleedings, late bleedings, salt-concentrated antitoxin (pseudoglobulin) and pepsin-treated antitoxin show in this order a progressive decrease in the proportion of the total unitage contributed by γ antitoxin.

These facts may possibly have some bearing on the recent clinical observations of McSweeney,[5] who has reported successful results in the treatment of a small number of cases of hypertoxic diphtheria with a particular antitoxic serum, the characteristics of which have been described by Trevan.[6]

This batch of antitoxin differed from the ordinary commercial antitoxin in the following respects:

1. It was "avid" as determined by the dilution-ratio test (Glenny and Barr [3]).
2. It contained an excess of the non-flocculating antitoxin of Barr and Glenny [3] as measured by the serum ratio—i.e., it had a high in-vivo/in-vitro ratio.
3. The serum ratio had been increased by a special method of salting-out which had been shown by Barr and Glenny [3] to increase the proportion of non-flocculating antitoxin (see above).

It seems reasonable to infer that the serum McSweeney first used was relatively rich in γ antitoxin, and that the second batch, which consisted of a later bleeding from the same horse, was relatively poor in this component, so that for a given total number of antitoxin units injected fewer γ antitoxin units were administered in the serum from the later bleeding than in the serum from the early bleeding.

Owing to the small quantities of material available it has not yet been possible for us to examine the avidity of purified γ antitoxin as measured by the dissociation of toxin-antitoxin complex on dilution (Glenny) and by the rate of combination in animal tests (Madsen). Meanwhile there is an indication that this antitoxic fraction may be avid, as defined above, because it has the short flocculation time and the high in-vivo/in-vitro ratio usually characteristic of avid sera. In view of McSweeney's assumption that the avid serum he used with success contained an abundance of the anti-B factor which O'Meara [7] considers to be essential in the treatment of hypertoxic diphtheria, it should be emphasised that both the β and γ antitoxin described by Kekwick and Record [2] neutralises the classical diphtheria toxin produced by a typical Park-Williams 8 strain, and that the diphtheria antitoxic sera investigated were prepared by the use of a similar Park-Williams 8 toxoid as antigen. Further experiments to test some of the points raised are in progress.

It is clear that in considering the specific treatment of diphtheria the existence of the β and γ antitoxins should be borne in mind, quite apart from any other special properties of the serum which may contribute to its curative action in hypertoxic patients. The relative clinical value of the β and the γ antitoxin will doubtless be determined in future investigations.

SUMMARY

An examination of diphtheria antitoxic horse sera by the technique of electrophoretic analysis has shown that of the three separable globulin components, two, the β and γ fractions, have antitoxic activity.

Both these proteins are specific antibodies to the classical diphtheria toxin prepared by the use of a Park-

Williams 8 strain, in that they neutralise this toxin in the usual animal test for potency (L+) and flocculate with the toxin in a balanced mixture (Lf).

There are striking differences between the two antitoxins as shown by the flocculation times, the in-vivo/in-vitro (L+/Lf) ratios, and the empirical composition of the floccules.

The relative and absolute amounts of the β and γ antitoxins altered during the course of immunisation in horses. Initially the amount of γ antitoxin increased more rapidly than the β antitoxin but soon reached a steady value. The β antitoxin of the serum increased more slowly to a much higher maximum value and contributed the major portion of the total unitage obtained at the end of the course of immunisation.

It is suggested that there may be a correlation between the avidity of a serum (as gauged by the Glenny dilution-ratio technique) and the relative proportion of γ antitoxin present.

The γ globulin (containing the γ antitoxin) is precipitated at lower salt concentrations than the β globulin and thus tends to be precipitated in the "euglobulin" fraction in the classical salting-out method of serum concentration. Furthermore the γ antitoxin appears in large measure to be lost in the "pepsin process" of serum concentration, the product there being probably a modified β globulin.

Early bleedings during a course of immunisation, late bleedings, salt-concentrated antitoxin (pseudoglobulin) and pepsin-treated antitoxin show in this order a progressive decrease in the proportion of the total unitage which is contributed by the γ antitoxin.

It is possible that the relative and absolute amounts of the two antibodies in any given sample of serum may have a bearing on its therapeutic efficiency.

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Reviews of Books

Hemorrhagic Diseases

Photo-electric study of blood coagulability. By KAARE K. NYGAARD, M.D., former fellow in surgery at the Mayo Foundation and former assistant surgeon at the University Clinic, Oslo. London: Henry Kimpton. Pp. 320. 28*s*.

FOR a proper idea of the contents of this book the titles should be reversed. It begins with a critical survey of methods for determining the coagulability of blood and goes on to a description of Dr. Nygaard's own method. In principle this depends on recording the amount of light transmitted through clotting blood-plasma to a photo-electric cell; the continuous photographic record of the diminution of the transmitted light is called the "coagelgram." By this means the kinetics and phases of blood coagulation are studied and their application to the theory of the details of this process is discussed. Control observations were made by watching the coagulation of blood by dark-ground microscopy and other methods and some interesting observations on the rôle of the platelets are presented. From the point of view of the clinical pathologist several useful points are brought out indicating the conditions that must be complied with if comparable results for "clotting times" are to be obtained. Nygaard uses citrated blood-plasma and clotting is started by recalcifying. The blood must be withdrawn into an oiled syringe and the volume of citrate added must be adjusted according to the hæmatocrit reading, so that a constant final citrate concentration is obtained; a chart is given for doing this. The blood is allowed to sediment—it must not be centrifuged for this removes a variable number of platelets—and then plasma and calcium-chloride solution are warmed to 37° C. before mixing. Similar precautions are described for determining the "prothrombin time"; Nygaard thinks that Quick's method is useful for detecting gross prothrombin deficiency, but is only a very rough quantitative measure of the prothrombin content of plasma. The application of these methods to some hæmorrhagic diseases is then given. He thinks that the platelets play an important part in initiating clotting, and, on account of their exceptional adhesive and agglutinating properties, in producing hæmostasis after injury of small vessels like capillaries. Hæmophilia is shown to be due to a quantitative deficiency of thromboplastin and Nygaard holds that a qualitative defect in the platelets is an important contributory factor. In thrombocytopenic purpura a definite hypocoagulability of the blood was found and connected with the diminution of the platelet count in the blood.

This work has not enabled Nygaard to suggest a satisfactory classification of the hæmorrhagic diseases and the list he gives is quite orthodox. The valuable portions of this book are the precise directions for obtaining comparable coagulation and prothrombin times and should influence even those who only need methods more simple than a photo-electric one.

Psychiatric Clinics for Children

By HELEN LELAND WITMER, Ph.D., research associate, National Committee for Mental Hygiene. New York: The Commonwealth Fund; London: Humphrey Milford, Oxford University Press. Pp. 437. 14*s*.

BEFORE the war this book would have been invaluable to the many of our students who found their way across the Atlantic as postgraduate fellows or otherwise. Now it is sometimes difficult to remember that there were times when an interchange of personnel was so free and so happily frequent. But because it is no longer possible to study at first hand in the United States the growth of the child-guidance movement, Dr. Witmer's book is all the more welcome on its appearance in this country. She has written a remarkably interesting and penetrating study. It escapes both the tedium of a merely descriptive list of clinics and the falseness of over-enthusiastic praise for what is, after all, still only experimental work, and therefore changing and adapting to varied conditions in the field. Dr. Witmer has for many years been a teacher of psychiatric social work; this may account for her objective approach and dispassionate account of a type of service for which she recognises a growing demand. Starting with a historical background of the movement, paying due tribute to the work of Adolf Meyer, then associated with G. Stanley Hall and William James, she considers the existing services provided by different States and the lines along which development is taking place. Passing from the early days to the boom years of dramatically expensive "demonstration" clinics, she outlines some of the present-day State programmes. It is encouraging to note the increasing acceptance of responsibility by the State for the mental welfare of its children, whether the community is an urban one or whether the service has to be adapted to the varied conditions in rural areas of America. Into this book can be read much of the historical and sociological development of a great democracy. And it creates again a vivid picture of clinics and personnel which must be held warmly in the memories of many workers in our own country who trained there. Perhaps most important of all, it serves to remind us of the demands made by the young people who develop maladjustments early in their lives, and their need for early and comprehensive treatment. Not even a state at war can afford to overlook that.

The Treatment of Diabetes Mellitus

(7th ed.) By ELLIOTT P. JOSLIN, HOWARD F. ROOT, PRISCILLA WHITE and ALEXANDER MARBLE. London: Henry Kimpton. Pp. 783. 35*s*.

A NEW edition of this well-known book is an event for all who are interested in diabetes. This edition, like its predecessors, ably discusses almost all the work on diabetes which has appeared up to the time of publication. The main appeal of the book is to the specialist, but its bias is not theoretical; on the contrary, it is essentially clinical. Experimental findings are regarded from the standpoint of practical medicine, and the purely clinical chapters are full of wisdom and experience.

THE LANCET

LONDON: SATURDAY, MAY 3, 1941

FUNCTIONAL DISORGANISATION OF THE KIDNEY

PHYSIOLOGISTS studying the kidney have in the past busied themselves largely with the frog. Technical obstacles made anything except histological work on mammals very difficult and few seriously considered the use of human subjects. The pathologists began their lectures on the kidney with acute nephritis and finished appropriately with that last stage of all—the small white organ. Between the two schools there was a great gulf fixed and for a long time there seemed no prospect of bridging it. Now this is changed; high blood-pressures have been experimentally produced by interfering with the renal blood-flow and are being studied from various angles.[1] Clinical investigators have challenged the physiologists by discovering a number of diseases in which the function of the kidney may be temporarily disorganised, and the physiologists have produced several elegant quantitative methods and a wealth of new information about the normal function of the kidney which has been of great service to the chemical pathologists. Thanks to the work of HOMER SMITH and his associates[2] it is now possible to measure the rate of glomerular filtration in the intact animal or indeed in man, and at the same time to get an estimate of the approximate blood-flow through the kidney.

The first of these procedures has been applied to the study of alkalosis,[3] of hæmatemesis,[4] and of diabetic coma,[5] all of which may be accompanied by a rise of blood-urea and functional renal disorganisation. In all, a fall of glomerular filtration-rate has been clearly demonstrated and goes far by itself to explain the rise of blood-urea. The cause of the fall in glomerular filtration-rate is not so easy to explain; a fall in blood-volume has been suggested as the cause, and also a fall in arterial pressure. Neither of these is wholly satisfactory, for in uncompensated alkalosis there is neither hæmoconcentration nor a pathological fall in blood-pressure. In experimental salt-deficiency we are up against the same difficulty; this state is accompanied by functional renal impairment, characterised by a rise in the blood-urea, and a fall in the glomerular filtration-rate. In the rabbit it is possible to demonstrate these changes when there is no fall in blood-volume and no important fall in general arterial blood-pressure.[6] BLACK and his colleagues[4] have now found that the fall in glomerular filtration-rate after hæmatemesis is closely related to a fall in the effective blood-flow through the kidney. This is a distinct advance in knowledge and it is to be hoped that similar studies will soon be made during salt deficiency and in uncompensated alkalosis. It is a great pity that the detailed and excellent studies of BICK and WOOD[7] did not embrace these measurements.

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The excretion of glucose in health and disease is another aspect of kidney function where physiologists and pathologists have recently pooled their resources. It has been known for a long time[8] that in diabetic coma the excretion of glucose may cease although the blood-sugar is far above the threshold levels. SHANNON and FISHER[9] demonstrated that the fixity of the glucose threshold was normally due to a steady glomerular filtration-rate and a capacity of the tubules to reabsorb up to but not more than so many grammes of glucose per minute. The abnormal findings in diabetic coma were then shown[5] to be due in all probability to a reduction in the glomerular filtration-rate while the tubule cells remained relatively normal. The "failure" of the kidney in some pathological states to excrete chlorides in the normal way[10 5] may turn out to be due to the same mechanism, and interest is enhanced by MCCANCE and YOUNG'S[11] discovery that normal infants may exhibit this reluctance to excrete chloride even when the levels of plasma-chloride are very high. In alkalosis and diabetic coma and after hæmatemesis the appearances of the kidneys are relatively normal post mortem, and the histological changes are never enough to justify the renal parenchyma being incriminated as primarily responsible for the disordered function. The same is true of the so-called reflex anurias which are still so heartbreaking to urologists and intellectually baffling to physiologists. But in this respect the failures of renal function after crush injuries differ, for in them widespread histological changes are at once discovered in the kidney and constitute a characteristic part of the syndrome. Although the cases of renal failure and injury lately described by BYWATERS and others[12] are undoubtedly connected with crushing injuries the exact connexion is still obscure, as are many aspects of the functional changes. All the patients seem to have had transfusions of plasma and nearly all of blood; the renal appearances and pigmentations recall those of incompatible transfusions. It is really too soon to place this pathological entity; much more work will have to be done on it. The clarification of other functional abnormalities of the kidney induced by disease has been delayed by the difficulty in reproducing the syndromes in animals. It is to be hoped that BYWATERS and his associates will be spared this handicap and that the problems of "crush" kidney may be solved in time to save many of the lives which will otherwise be lost.

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EVACUATION OF ARMY CASUALTIES

THERE is growing evidence that the Army organisation and equipment for the evacuation of casualties from the front line to the base hospital requires modification to meet the circumstances of the new mechanised and mobile warfare. War on land is approximating more and more to war at sea. There are no fronts; superiority of equipment results in rapid and overwhelming advances; and thanks to aircraft the range of fire is now unlimited. In addition, the stations and personnel for the care of the

wounded have clearly become—in the enemy's eyes—military objectives of some importance. Rapid evacuation to a point at which skilled surgical treatment can be given has always been recognised as fundamental; it has now become all-important. It may indeed be cynically suggested that Hitler can conquer a European country in the time taken for a single casualty to pass through the traditional hands of the regimental aid post, advanced dressing station, main dressing station and casualty clearing station to base hospital. In the article on medical organisation in the Royal Army Medical Corps and the Spanish Republican Army which appears on another page the suggestion is made that the advanced and main dressing stations should be replaced by an advanced casualty clearing station, consisting of small mobile teams complete in themselves, which can be rapidly evacuated or reinforced. An alternative is the scheme actually evolved in Spain in which a classification post was substituted for the advanced dressing station and main dressing station and the casualty clearing station was pushed forward into the position usually taken by the main dressing station. As a result of experience in France, Colonel J. C. DOWSE [1] has come to a similar conclusion. In his view the ideal is for a casualty to be "collected in a motor vehicle as near the regimental aid post as possible, taken to a medical post where rapid first-aid can be given, and from there sent direct to the casualty clearing station—i.e., cutting out one of the present posts, either the advanced dressing station or the main dressing station. . . . All that is required is that there should be but *one* 'sorting' office in the divisional area where first-aid can be given to the wounded man after he leaves the regimental aid post; whether this place is called an advanced dressing station or a main dressing station is quite immaterial. The casualty should not be moved in and out of two cars before he is sent on his final trip to the casualty clearing station." But this can only be done if the number of ambulance cars in the division is considerably increased and the composition of the field ambulance greatly modified. Even the present establishment is inadequate to stand the strain of the inevitable overloading, and equipment requires overhauling in other ways. For instance, Colonel DOWSE points out that the water-cart trailer cannot be backed for any distance and may cause chaos in a mobile column in which it is the only trailer vehicle. These deficiencies, and particularly the question of the redundancy of either A.D.S. or M.D.S., deserve careful consideration.

THE HÆMORRHAGIC DISEASES

WE cannot hope to understand or control hæmorrhage, says MACFARLANE,[2] unless we are fully familiar with the normal mechanism of hæmostasis. He points out that three factors, at least, are involved: the coagulation mechanism of shed blood, the blood-platelets, and the injured blood-vessels themselves. When capillary blood-vessels are injured they remain for a short time dilated because the tissue damaged in the injured area liberates Lewis's "H" substance; the H substance diffuses, or is washed away, and then the capillaries actively contract so that no more blood enters the wound. The blood that remains in the wound soon clots, the presence of tissue juices and degenerating platelets producing the thrombokinase which initiates the clotting. By the time the capillaries dilate again a firm clot is in position, a clot firm enough to withstand the blood-pressure within the capillaries, and so hæmostasis is secured. In this sequence MACFARLANE regards the capillary contraction as the most important factor. Coagulation of the blood will not of itself stop bleeding; small punctured wounds made into the skin of animals whose blood has been rendered completely incoagulable do not bleed any longer than usual; there is a definite latent period before clotting of the blood begins, minutes elapse before a firm clot forms, so that the mere presence of issuing blood would suffice to prevent its formation. He thinks that the blood-platelets are only of importance in producing the kinase which initiates clotting and possibly in assuring proper clot retraction; he does not see how without cessation of the blood-flow platelets can agglutinate sufficiently to plug the mouths of the vessels. The figures he quotes make it clear that the correlation between spontaneous hæmorrhage and diminished blood-platelets does not hold; everyone sooner or later meets with the patient whose low platelet-count is unaccompanied by hæmorrhages and other patients have hæmorrhages with excessive blood-platelets.[3] There is, moreover, the curious phenomenon that splenectomy often cures the hæmorrhagic tendency in spite of the fact that after a postoperative rise the blood-platelets return to their former low level.

So we must turn to the capillary blood-vessels. MAGNUS in 1924 noted that they disappeared after an injury; MACFARLANE in his experiments limits trauma by pricking individual capillaries in the nail-fold observed under a skin microscope, and he finds that in most normal subjects there is hæmorrhage for a few seconds, then the capillary disappears and does not reappear for 20–120 seconds; the capillary contraction is active since it is maintained against a venous back-pressure of 30 mm. Hg. There is some variation in the response and in two out of his twenty subjects no response at all was observed. Parallel observations were made by IVY and others,[4] who found that the bleeding-time was normally unaffected by a venous back-pressure of 40 mm. Hg, but in some purpuric patients it could be greatly prolonged by this means even though platelets and coagulation time were normal, thus suggesting that "toxic damage" to the capillaries can by itself be a cause of hæmorrhage. On this basis MACFARLANE proposes a classification of the hæmorrhagic diseases into three groups: those due to defective capillary contraction, those due to defective blood coagulation, and those due to a combination of these causes. Into the first group he puts all the purpuras, thrombocytopenic and athrombocytopenic. In four cases of the former and five of the latter he found irregular and distorted nail-fold capillaries that did not respond to puncture, and in one case of symptomatic purpura (aplastic anæmia) the capillaries were regular but did not respond to puncture. He does not think that qualitative or quantitative deficiency of platelets matters at all, except that clot retraction may thereby be

1. *Jour. R. Army med. Cps*, March, 1941, p. 127.
2. Macfarlane, R. G. *Quart. J. Med.* January, 1941, p. 1.
3. Reid, J. *Lancet*, 1940, **2**, 584.
4. Ivy, A. C., Shapiro, P. F. and Melnick, P. *Surg. Gynec., Obstet.* 1935, **60**, 781.

rendered less effective. The essential defect is inability of the capillaries to contract after injury. He points out that hæmorrhage in these diseases is mostly localised to skin and mucous membranes, rarely to deep tissues, and that pressure will usually stop the bleeding since it gives time for a clot to form. The prototype of this group is hereditary hæmorrhagic telangiectasia with its localised collections of dilated and inactive capillaries. Hæmophilia and hæmorrhage of the newborn are examples of defects of blood coagulation. The hæmorrhagic tendency in jaundice he places in the third group.

The idea that all the purpuras are diseases of the capillary blood-vessels is certain to meet with criticism—MACFARLANE acknowledges, for instance, that it provides no satisfactory explanation of the improvement after splenectomy of thrombocytopenic purpura—and it is therefore useful to examine a contemporary contrasting view. NYGAARD,[5] in his book reviewed on another page, has approached the problem by studying in detail the clotting of recalcified blood-plasma under controlled conditions. He is not unmindful of capillary contraction after injury, but he assigns an active rôle to the platelets. He emphasises their exceptional adhesive properties and thinks that platelets are capable of adhesion and agglutination even in face of the blood-stream from injured capillaries, and he describes changes in the size and outline of the platelets before fibrin actually appears in blood-clots. He upholds the theory of DUKE that small vessels may be mechanically closed by platelets and suggests that the platelets that escape into the wound begin to disintegrate at once and liberate thrombokinase, which, added to that from the tissue juices, initiates coagulation. With such views it is not surprising that he classifies thrombocytopenic purpura as "of hematologic origin," especially since his methods show some diminished coagulability of the blood in this disease. For the familial athrombocytopenic purpuras he accepts the theory of defective platelets, but the toxic and Henoch-Schönlein types are classified as non-hæmatological.

Research into the causes of hæmorrhagic diseases is certainly in a phase of activity, as shown by the work on vitamin K, on the rôles of vitamins C and P and the presence of thrombocytopen,[6] and now by the reassertion of the importance of the capillaries by MACFARLANE and of the platelets by NYGAARD. When the relative value of all this work can be assessed we ought to have made notable progress towards an ætiological classification of the hæmorrhagic diseases which will be of real help in treatment.

IS ALCOHOL A STIMULANT?

THE belief that alcohol acts as a stimulant has its roots in centuries long past. "Mankind has grown old," said ARNOLD of Villanova, "and has become feeble; therefore God has given him this water of life that he may grow young again." Many other non-medical writers, usually poets, have recorded remarkably accurate observations showing how reasonable it is to suppose that alcohol is essentially a stimulant. HORACE gave the classic description of its psychic effects: "What wonders does not wine! It discloses secrets; ratifies and confirms our hopes; thrusts the coward forth to battle; eases the anxious mind of its burden; instructs in arts. Whom has not a cheerful glass made eloquent! Whom not quite free and easy from pinching poverty!" At the end of the 19th century BINZ and his pupils published a series of papers on the effects of alcohol which they thought could best be explained on the basis of stimulation followed by depression. Their views were probably the more acceptable to pharmacologists and toxicologists because the "pattern" exhibited by alcohol is often seen in the pharmacodynamics of other potent substances. SCHMIEDEBERG[1] opposed this view and contended that the action of alcohol is purely narcotic from the start, and that stimulation is only apparent, depending on paralysis of those cerebral functions which normally play a restraining part. It is nowadays accepted that the increased self-confidence and the assumption of a benevolent, communicative disposition are release-phenomena and are attributable to depression of the faculty of self-criticism.

The conception that alcohol might have a selective stimulating action on some parts of the nervous system while behaving as a depressant elsewhere is seen in EMIL KRAEPELIN'S[2] work of fifty years ago. He held that alcohol is entirely depressant to sensory and intellectual processes, but that the generation of motor impulses is first stimulated and only later depressed; these are essentially BINZ'S conclusions restricted to the motor mechanisms of the nervous system. In 1923 a committee of British pharmacologists expressed the opposite view in a publication of the Medical Research Council.[3] From experiment they concluded that the action of alcohol on the nervous system is essentially sedative; that it was not a cardiac stimulant; and that it had no noteworthy effect on respiration in moderate doses though in large doses it paralysed the respiratory centre. They pointed out that the reflex stimulation of the heart and respiration which follow irritation of the buccal and pharyngeal mucosa by alcoholic beverages must not be credited to the alcohol itself; in wines, the bouquet due to higher esters may similarly confuse the issue. In order to eliminate the indirect results of psychical instability engendered by communicative companions the subject of the experiment, they insisted, must be segregated. The reader is left with the conviction that whatever may be the merits of alcohol as a therapeutic agent (and they are not to be underrated) it does not qualify for the description of "stimulant." But this does not mean that the last word has been said or that the work of BINZ and his followers is discredited. On the contrary, recent experimental findings suggest that within certain limits of dosage the alcohol metabolised by the nervous system may produce stimulation after all. The uncertainty dates from a study made by J. D. ROBERTSON and C. P. STEWART[4] some ten years ago showing that the oxygen uptake of the brain is significantly increased during the first hour of alcoholic intoxication. MASSERMAN, BEALE and SANDERS[5] have recently been working with cats to determine the action of ethyl alcohol on cortico-hypothalamic function. Under

5. Nygaard, K. K. Hemorrhagic diseases. Photo-electric study of blood coagulability, London, 1941.
6. See *Lancet*, March 15, 1941, p. 356.

1. Textbook of Pharmacology and Therapeutics, by E. Poulsson. London, 1923.
2. *Biochem. Bull.* 1916, **5**, 223.
3. Alcohol: its Action on the Human Organism, London, 1923.
4. *Biochem. J.* 1932, **26**, 65.
5. Masserman, J. H., Beale, J. and Sanders, R. *J. Pharmacol.* 1940, **70**, 450.

Nembutal or light ether anaesthesia needle-electrodes are introduced into the cat's brain, and the effect of electrical stimulation is noted, first when the cat has had no alcohol and then when alcohol has been introduced through the needle electrodes. The method is elaborate and artificial, and thus open to serious criticism unless the data obtained are scrupulously controlled. A comprehensive preliminary study was undertaken by J. H. MASSERMAN[6] in order to meet these objections. He reports that simple electrical stimulation of the hypothalamus induced behaviour suggestive of rage and fear; neutral solutions injected through the needles produced no effect; weak alcohol (0·05–0·1 c.cm. of 0·1% alcohol in Ringer's solution) made the hypothalamic response to electrical stimulation more pronounced in a significant proportion of experiments. Intraperitoneal administration of alcohol (0·5–1 c.cm. per kg. bodyweight) did not produce any material change. The responses of the posterior sigmoid cortex were not significantly affected by the direct injection of alcohol, but in some instances they were increased by the previous intraperitoneal administration of alcohol. It is well known that general anæsthetics and basal narcotics have actions on the nervous system which are predominantly selective for certain strata of the brain. MASSERMAN'S observations that the stimulating effect of alcohol on the hypothalamus was abolished by nembutal, and that its action on the cortex disappeared under light ether anæsthesia, are therefore consistent with accepted teaching regarding the mode of action of these anæsthetics; and this evidence supports his main thesis concerning the pharmacology of alcohol. The graphic records of the pulse-rate, blood-pressure and respiration included in MASSERMAN'S paper show that the injection of 0·1 c.cm. of 0·1% ethyl alcohol in Ringer's solution produced no direct effect, but the subsequent responses of the hypothalamus to 2·5 volts exceeded those elicited by twice that strength of current before the injection. These experiments justify the tentative conclusion that alcohol facilitates certain reactive processes in the brain (especially in the lower diencephalic centres); and if this is so its action is analogous to that of strychnine on the spinal and bulbar reflexes. It remains to determine the therapeutic usefulness, if any, of this transient stimulation. With the growth of neurosurgery the time seems ripe for the renewal of coöperation between pharmacologist and surgeon on the lines of the fruitful partnership that once existed between CLOËTTA and SAUERBRUCH.

6. *Ibid*, 1938, **64**, 335.

Annotations

KNOCK ON THE HEAD

DISCUSSING the physical aspects of concussion at the Royal Society of Medicine on April 17, Major Denny-Brown and Major Ritchie Russell quoted experiments to show that concussion in closed-head injuries is caused by a sufficient rate of change of velocity; in the cat and monkey they found a threshold value for change from 0 to 28 feet per second in ca. 1/2000 sec. This constant threshold of acceleration or deceleration sets aside the factor of momentum; it is the change in speed and not the weight of the brain that matters. The momentum attained or arrested may be identical in a man with a helmet and a man without; but the helmet will cushion the blow sufficiently to prolong the time spent in changing velocity, and thus prevent concussion. Their observations explain how blast, which imparts velocity at a slower rate than a solid object, seldom has direct concussing effects. If the head is supported by a solid mass and thus prevented from moving, concussion does not occur unless the impinging force causes fracture or penetration of the skull. In penetrating injuries concussion can result from a sudden change in cerebrospinal-fluid pressure; this differs from simple concussion, they find, in affecting respiration more readily and severely. When concussion is caused by change in velocity in a closed-head injury there need not be any rise in C.S.F. pressure. They found that there is paralysis of all brain-stem reflexes in concussion, with recovery of different reflexes at different intervals. With graduated blows the four reflexes—corneal, swallowing, pinna and respiratory—became paralysed when the same intensity was reached. This supports the view that concussion is a direct and generalised physical effect on the neurones; and, like other nervous reactions, requires an adequate stimulus to elicit it. Paralysis passes off at different rates in different neuronic elements, and the cerebral cortex may be expected to suffer longest. They found a greatly increased blood-flow in the cerebral vessels in concussion and also in subconcussive injuries; this is related to stimulation of the depressor fibres of the vagus and glossopharyngeal nerves which suffer damage at the foramen magnum even when the injury is insufficient to cause concussion. They therefore reject the hypothesis that cerebral anæmia is an essential component of concussion. A delayed fall in blood-pressure was found to follow vagal injury; if vagal stimulation is intense, post-traumatic collapse, shock and even death may follow. Concussion—even fatal concussion—could arise, they found, without lesions visible in stained sections; and they claim that a sound case for "molecular change" in nerve-cells can be established as a basis for concussion.

At the same meeting an analysis of retrograde and post-traumatic amnesia in 200 cases of head injury was reported by Dr. J. W. Aldren Turner and Mr. Kenneth Eden. They pointed out that while severe cerebral contusion may produce a lengthy loss of consciousness the onset may be delayed. With superficial penetrating injuries of the brain there is often no immediate loss of consciousness; but injuries reaching the basal portion of the brain produce deep loss of consciousness. Concussion in penetrating injuries may result from a fall to the ground after the injury. Their analysis strengthens the clinical impression that immediate loss of consciousness is the result of a generalised effect on the brain, though they are inclined to relate it to some form of damage to the basal nuclei.

INTRAPERITONEAL CHEMOTHERAPY

THE bacteriostatic activity of the sulphonamides in potential and established infections of the peritoneum forms the subject of several recent papers. Vaughan Hudson, Smith and Selbie[1] have attacked the surgical problem of acute intestinal obstruction, in which, as they point out, the fatality is still 20–30% in spite of improved diagnosis and treatment. Their analysis of 670 cases shows that the highest fatality is among those in which gut has been resected; in these death is due not so much to dehydration and toxæmia as to plastic peritonitis. Since it is virtually impossible to avoid peritoneal contamination when gangrenous gut is resected Vaughan Hudson and his collaborators have tried to combat bacterial infection by chemotherapy. Early trials with administration by mouth having proved disappointing in the treatment of postoperative

1. Hudson, R. Vaughan, Smith R. and Selbie, F. R. *Lancet*, April 5, 1941, p. 438.

peritonitis, they devised experiments on rabbits to ascertain whether deliberate contamination of the peritoneal cavity by the contents of the gut would excite a plastic peritonitis similar to that observed in man, and if so to determine what organisms were responsible and whether such peritonitis could be prevented or modified by sulphonamides. Their experiments demonstrated that the expected plastic peritonitis due to *Bacillus coli* does result from the contamination. The simultaneous injection of a saline suspension of sulphanilamide into the peritoneal cavity limited the reaction to the immediate locality of the puncture in the gut and the abdominal incision, whereas a single large dose of the drug given by mouth was ineffective. It would have been well to investigate also the results of giving repeated doses by mouth sufficient to keep the blood-concentration at an effective level for a longer period. Further experiments, in which normal living gut was resected, showed that intraperitoneal sulphanilamide was able to limit the spread of the infection; resection of strangulated gut in the rabbit proved too highly fatal for crucial experiments. This form of chemotherapy is also favoured by S. Rosenburg and N. M. Wall,[2] who found that sulphanilamide exercised a protective effect when injected simultaneously with bacterial cultures into the peritoneal cavities of rats. The bacteria were of various kinds, being derived from human cases of suppurative peritonitis and from the contents of acutely inflamed appendices. Control animals receiving bacteria but no sulphonamide died in various stages of peritonitis. If, however, varying lengths of time were allowed to elapse between the inoculation of bacteria and injection of sulphonamide the protective effect of the drug was by no means so great.

The case for treating human subjects along these lines seems unanswerable. Vaughan Hudson and his colleagues mention a favourable issue in 2 instances where resection of the gut for intestinal obstruction was necessary. On the medical side K. M. Alford[3] finds that sulphonamide therapy has greatly reduced the mortality from acute diffuse peritonitis at the Hospital for Sick Children, Toronto. He stresses the importance of needling the peritoneum at an early stage in order to identify the invading organism, and recommends oral sulphanilamide for streptococcal infections and sulphapyridine for pneumococcal. In diffuse peritonitis secondary to neglected appendicitis he supplements surgery with soluble sulphapyridine intravenously until drugs can be taken by mouth, followed by a course of oral sulphapyridine or sulphanilamide, and he is satisfied that chemotherapy has reduced the fatality in these cases also. The abundance of recent work supporting the local application of sulphonamides in infective conditions suggests, however, that the intraperitoneal route is fundamentally sound.

2. *Surg. Gynec. Obstet.* March, 1941, p. 568.
3. *Arch. Dis. Childh.* March, 1941, p. 43.

CALLING UP THE PHARMACISTS

THE new schedule of reserved occupations by bringing the age of reservation of pharmacists up to the age of thirty raises the question of how many can be spared if an adequate pharmaceutical service for civilians is to be maintained. About 8400 of the 25,000 registered pharmacists are at present under thirty, and about 20,000 of the total are engaged in chemists' shops, whether as owners, managers or qualified assistants. About the same proportion—80%—of the pharmacists who will become liable to be called to the colours after July 1 are occupied in the retail business, so that if all the 6700 were taken there would be left only 13,300 to conduct 15,000 pharmacies, that being, in round figures, the number of registered shops. Hence, if only one qualified person were allotted to each pharmacy it would be necessary to close 1700 chemists' shops if every one of the men liable for military duty was called up. The war committee of the Pharmaceutical Society, which includes nominees of the three Service departments and the Ministry of Health, has represented to the Government that the maintenance of an adequate pharmaceutical service for the public necessitates the retention in civil life of some, at least, of the men under thirty, and it is understood that the Ministry of Labour is in accord with the proposition that exemptions shall be allowed in special cases, but that the retention of key men in civilian life will be permissible only where they are required urgently for the continuation of a civilian service in their areas. The war committee has been charged with the duty of making recommendations regarding exemptions, and has begun a general survey of pharmacies relative to population. It is hoped that the information so obtained will make it possible to release a maximum number of pharmacists for military duties with the minimum amount of prejudice to the pharmaceutical needs of the public. Special notice will be taken of N.H.I. demands and there will be consultations with the insurance committees and the pharmaceutical committees under the N.H.I. Act. Special arrangements are to be made for pharmacists engaged in hospital work. The war committee has also undertaken a survey of students to ensure that only those proceeding bona fide to qualification shall be reserved from military service; the cases of all pharmaceutical students will be reviewed individually every six months. As many as possible of the pharmaceutical recruits will go into the R.A.M.C. as dispensers, but not more than a few hundred can be so absorbed.

VERATRUM IN ECLAMPSIA

THE older textbooks of obstetrics often advocate the use of veratrum or American hellebore[1] in the treatment of eclampsia, but modern writers either do not mention it at all or condemn it. Bryant and Fleming,[2] however, sponsor the drug with enthusiasm. Their cases number 120 and cover a period of 15 years, so that their conclusions, though contrary to the trend of modern opinion, merit close examination. They look upon eclampsia as a syndrome of which the essential pathological feature is an abnormal spasm of the entire arteriolar tree. They accept the orthodox view that the underlying cause of the spasm is some undiscovered toxin. Veratrum has long been known as a powerful vasodilator, and Bryant and Fleming claim that in therapeutic doses it is entirely safe—a claim vindicated by their low fatality of 1·7%. They aim at complete control of the eclampsia, and only when this has been achieved do they consider the secondary problem of terminating the pregnancy; in this they adhere strictly to the best doctrines of conservatism. The preparation used is not mentioned in this paper, but Bryant has previously reported[3] that he uses Veratrone (P. D. and Co.), a standardised non-alcoholic solution of the active principles of veratrum roughly equivalent in alkaloid content to the B.P.C. tincture. An initial dose of 0·6 c.cm. is given hypodermically, and this is repeated every 10–15 minutes until the pulse-rate falls below 60 or the systolic blood-pressure below 120; thereafter, until the patient is conscious, 0·2–0·6 c.cm. is given again if the pulse-rate rises to 80 or the systolic blood-pressure to 150. Once the patient is conscious a dose of 0·2–0·6 c.cm. is given if there is nausea, severe headache, visual disturbance, epigastric pain or convulsions.

As an adjuvant, 500 c.cm. of 20% dextrose is given intravenously at the beginning of treatment and repeated

1. Both *Veratrum album* and *V. viride* are listed in the B.P.C. The former is a noxious and ugly lily growing on alpine pastures in Europe where it plays havoc with grazing cattle. White hellebore root was once used internally for dropsy. The latter whose rhizome contains the same alkaloids is indigenous to Canada and the north-eastern U.S.A. and is there known as green hellebore, a name given in this country to a pleasant herb of the buttercup tribe, a fellow species of the Christmas rose, another hellebore. Both these British hellebores were also at one time popular remedies.
2. Bryant, R. D. and Fleming, J. G. *J. Amer. med. Ass.* Oct. 19, 1940, p. 1333. 3. *Amer. J. Obstet. Gynec.* 1935, **30**, 46.

every 6–10 hours until consciousness returns; 10 c.cm. of 50% magnesium sulphate is also given at the start by deep injection and afterwards 5 c.cm. every 6 hours for four doses and 5 c.cm. every 12 hours for four doses. The patient is catheterised and given a soap and water enema at the beginning of the treatment. The pulse and blood-pressure are checked hourly in the acute stages and at short intervals after the patient has recovered consciousness. Fluids are pressed to the point of complete hydration, 5 litres a day being given as soon as possible, and a salt-free diet is instituted as soon as food can be tolerated. Fluid intake and urinary output are checked and the urine examined daily for albumin. No sedatives are given except in cases of extreme restlessness or if the patient goes into labour; they claim that the three commonest causes of restlessness in these semi-comatose patients are a full bladder, a full rectum and the pains of labour. The results of veratrum may be startling enough to alarm the uninitiated by a sudden fall of blood-pressure, with extreme slowing of pulse and respirations (for all of which atropine is an effective antidote if required), and may be followed by a copious vomitus of green or black fluid. The usual nursing regime for eclamptic patients must be strictly enforced to ensure proper postural drainage of the mouth and pharynx.

According to Bryant and Fleming, in eclampsia a vaso-constricting toxin produces hypertension which may be complicated by cardiac failure and cerebral and retinal hæmorrhage; and this vaso-constriction causes local anoxæmia and retention of catabolites with resultant focal necrosis in the liver and kidney. It is feasible to correlate this clinical picture of a full-blown eclamptic with the pathology demonstrable at autopsy. Dilatation of the arteriolar tree with veratrum breaks the established vicious cycle, and, by making a normal blood-supply available to the tissues, enhances the action of such therapeutic agents as dextrose and magnesium sulphate. The primary function of this drug is, therefore, to improve arterial circulation throughout the body and not merely to reduce the effect of hypertension. More extensive investigation of the action of veratrum is needed to determine whether we have not prematurely discarded a powerful therapeutic weapon. The maternal mortality of 2 cases in 120 is especially remarkable in that both patients died of puerperal sepsis, long after control of the eclampsia and delivery. The gross fœtal mortality was 28·8%, the greatest number of deaths being in the antepartum eclamptics. It must not be forgotten, however, that Bryant and Fleming also used hypertonic dextrose and magnesium sulphate, both of which are potent agents in the reduction of a high blood-pressure.

THE PLACE OF BIOPSY IN DIAGNOSIS

IN discussing the limitations of biopsy in X-ray therapy Dr. F. Roberts asks whether this method of diagnosis is not sometimes carrying things too far. In cases of doubt it is clear that every possible means should be adopted to reach a definite diagnosis but there is another class of patient to which he refers, where clinical and radiological examinations have already provided clear evidence of malignancy, and here Dr. Roberts suggests that biopsy is being performed partly from the conscientious motive of making assurance doubly sure and partly out of academic interest. This practice is nowadays rare in a well-explored field such as carcinoma of the rectum, and is generally viewed with disfavour in sarcoma of bone where the risks of dissemination are serious, but it is becoming an increasingly common practice in carcinoma of the lung. As Dr. Roberts puts it, from seeing the growth with the bronchoscope to removing a piece for microscopical examination seems such a short and logical step to take. His arguments against undue enthusiasm in this direction are (1) excluding some uncommon endobronchial tumours (e.g. adenomata) radiological examination in carcinoma of the lung, especially with the aid of lipiodol, "gives us a diagnosis as certain as anything in medicine can be certain"; (2) to put a very sick person through another ordeal when he has a drastic course of treatment in front of him shows a lack of confidence in well-proved methods of examination; (3) it is not always possible to remove by bronchoscope a representative portion of growth, and failure to do this may confuse the issue; (4) in the present incomplete state of our knowledge the conduct of a course of X-ray treatment cannot be influenced by the finer degrees of malignancy seen microscopically—to the radiotherapist a mass is, as a rule, malignant or not. And as a corollary to this last argument Dr. Roberts expresses the opinion that there is no known relation between the finer graduations of malignancy as seen microscopically and the subsequent clinical course. This last argument, he believes, raises the fundamental question: what is malignancy? To the pathologist, he answers, it is something determined by certain histological appearances; to the clinician and radiotherapist it is something which is going to kill the patient either by local growth or by dissemination, and it is the business of the radiotherapist to try and save this patient's life or at least ameliorate his condition without too much regard to the pathological distinctions. Therefore, he says, the radiotherapist should not insist on biopsy except where the diagnosis is in doubt. But the case is not quite convincing. It is questionable if everybody will accept the simple practical implication that cancer of the lung is something that is going to kill the patient either by local growth or by dissemination and that histological appearances are relatively unimportant. It is not clear, for instance, whether Dr. Roberts is including malignant disease of the mediastinum, in which the clinical course is different from that of carcinoma of the bronchus, in his broad simple classification. Surely a great deal depends on the stage at which patients come under observation. As they tend to come earlier there will be more doubtful cases needing biopsy diagnosis.

1. Roberts, F. *Brit. J. Radiol.* April, 1941, p. 144.

G. W. CLARKSON KAYE, D.Sc., F.R.S.

THE new science of physics in relation to medicine has lost one of its pioneers and a most outstanding personality by the death on April 16 of Dr. G. W. C. Kaye. Born in 1880 at Harrogate, the son of an architect, Kaye showed an early interest in physics and as a boy in the upper school assisted his physics master in operating one of the first X-ray tubes used in this country. He had a brilliant career at the Royal College of Science and later at Cambridge, where in 1905 he began research into the properties of X rays, with particular reference to the laws governing the emission of the rays and their absorption in matter. In 1910 he was appointed to the staff of the National Physical Laboratory and when, in 1913, the routine testing of radium was begun it naturally fell to his lot to carry out this work. His close association with medical radiology dated from the formation in 1921 of a mixed committee to protect from injury, immediate and remote, those who handled X rays and radium. His studies on methods of safeguarding workers enabled this committee to make its searching recommendations and to revise them again and again as data accumulated. Kaye was thorough in everything he undertook and his wide range of interests led to many calls on his time. He was president of the Röntgen Society in 1917–18, of the British Institute of Radiology in 1928–29, and at the time of his death of the Society of Radiographers. His merit was well recognised abroad and he was elected an honorary member of radiological societies throughout the world. Latterly he gave much thought to needless noise and presided over the commission of the League of Nations which sought means to suppress it.

Special Articles

MEDICAL ORGANISATION IN THE R.A.M.C. AND SPANISH REPUBLICAN ARMY

OF the many lessons that England might have learnt from the Spanish war it is not surprising that the more technical were the more easily assimilated. Our debt to Spain in the realm of A.R.P., blood-transfusion, and anti-tank measures is real, though rarely stressed. Military medical organisation, however, has hardly been mentioned, possibly because the number of doctors who have experience both of the Sanidad Militar and the R.A.M.C. is small. The differences between the two organisations are worth considering.

The R.A.M.C. was formed to meet the exigencies of the last war, when aerial warfare on a large scale was hardly dreamed of. Fig. 1 is a rough scheme showing its casualty organisation.

When a man is wounded the regimental stretcher-bearers apply the first field dressing and carry him to the regimental aid-post (R.A.P.) where he is seen by the M.O. He is then conveyed to the advanced dressing station (A.D.S.) by field ambulance or stretcher-bearers, where he only receives such attention as is urgently needed. An A.D.S. is formed by one company of the field ambulance. It is little more than a collecting centre and is similar to the classification post of the Sanidad Militar. It is laid down in the R.A.M.C. Training Manual that a walking-wounded collecting post (W.W.C.P.) may be established to relieve pressure on the main dressing station (M.D.S.) but that this is not to be done in mobile warfare.

From the A.D.S. the sick and wounded are evacuated to the M.D.S., formed by the headquarters of the field ambulance. The personnel and equipment here are not such as to allow of adequate surgical treatment of severe cases, though emergency operations must sometimes be attempted, but in the main the wounded merely have their dressings readjusted and receive their antitetanic serum and hot drinks. From the M.D.S. the wounded are evacuated to the casualty clearing station by the motor ambulance convoy (M.A.C.). The C.C.S. is too large a unit to be moved readily; some 48 hours will elapse before such a station can be detrained and made ready to function. During war, the personnel is altered

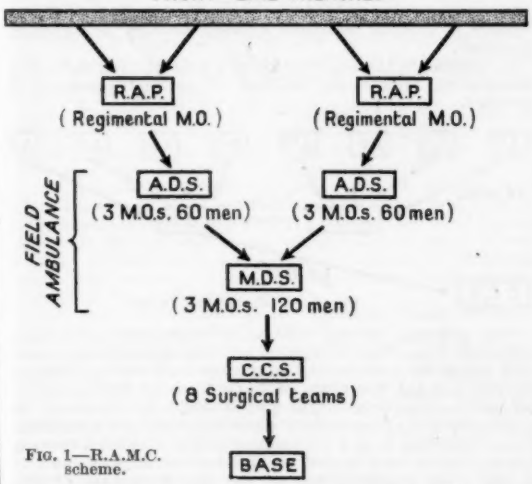


FIG. 1—R.A.M.C. scheme.

to form surgical teams, but these teams must be clearly differentiated from the teams of the Sanidad Militar. The R.A.M.C. teams include only the personnel of the operating-theatre, and though they may be lent to other C.C.S.s they are not complete independent units.

The R.A.M.C. triple organisation—A.D.S., M.D.S., and C.C.S.—was developed in the times when evacuation from the A.D.S. to the M.D.S. was by horse-drawn ambulance, and from the M.D.S. to the C.C.S. by motor ambulance. In these days a motor ambulance can usually get very near to the R.A.P. The two delays for the wounded at the A.D.S. and the M.D.S. without adequate surgical treatment, and the immobility of the C.C.S., are worth noting. In France, owing to the mobility of the front, it was often impossible to find the M.D.S., and casualties were often evacuated direct to the C.C.S. and even to the

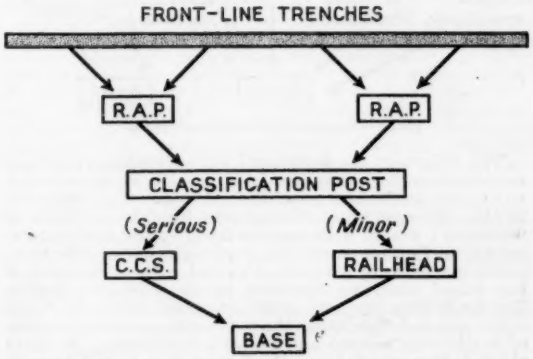


FIG. 2—Casualty organisation in Spanish Republican Army.

base; but light C.C.S.s more mobile than the usual type proved useful.

THE SPANISH PLAN

The Sanidad Militar grew up during the Spanish war, and was thus specially adapted to conditions of aerial warfare and a rapidly moving front. It is difficult to give details of the organisation as clearly as those laid down in the R.A.M.C. Training Manual because it was a growing organisation, constantly adapting and improving itself. It was founded on the idea of mobile-teams—surgical, "triage," blood-transfusion, X-ray, kitchen and others. These were normally under corps control, and had their headquarters at or near the base hospital, where they worked until required elsewhere. The teams were complete in every way; thus the surgical teams had their own instruments, sterilising apparatus, operating tables, beds, linen and ward equipment, and adequate transport for equipment and personnel.

The "triage" team consisted of 2 doctors, 2 nurses, 4 medical orderlies, 2 barbers and 12–20 stretcher-bearers. The job of the team at the C.C.S. was the reception, classification and preparation of the wounded for operation; they also decided on priority of cases for surgical treatment and arranged evacuation of the wounded. A similar unit ran the classification posts. From such units the casualty organisation was built up, the complete scheme being as in fig. 2. The organisation was so flexible that various other schemes could be put into operation as the occasion demanded, such as that shown in fig. 3.

The regimental aid-post (R.A.P.) was run by the regimental M.O. and his staff on similar lines to posts in the R.A.M.C. It was, however, generally agreed that if gas was used there would be two M.O.s per battalion. The classification post was under divisional control, there being usually two to a division. It was staffed by one or more "triage" teams. Its function was to check the first-aid given by the R.M.O. or his stretcher-bearers, and to classify the wounded and evacuate them accordingly. The classification naturally varied with the type of organisation behind the post, as shown in the previous diagrams. The casualty clearing station was built up, as already explained, of 6–8 surgical teams with a "triage," blood-transfusion and other teams, all under the control of a medical superintendent. Such stations were extremely mobile, and the hospitals were often put up in 8 hours. They were placed much nearer the front than an R.A.M.C. casualty clearing station—more in the position of a M.D.S. Thus they were always liable to air attack and were sometimes within artillery range. For this reason they were placed for choice in caves, tunnels, camouflaged tents in woods, or in cellars.

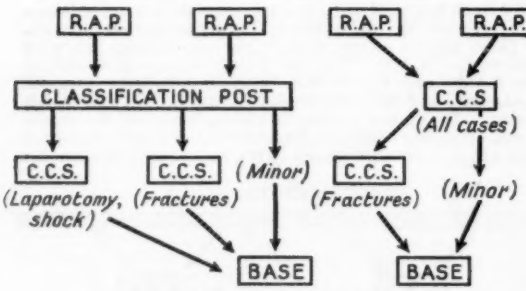


FIG. 3—Variation of the Spanish plan.

The object of the peripheral part of military medical organisation during action is to get the wounded back to the base in the best possible condition. This naturally implies different types of treatment for different types of wounded: a man with a minor flesh wound after receiving his antitetanic serum can go straight back to the base, while one with an abdominal wound with perforation of the bowel must be operated on as soon as possible. The work falls into two parts: first-aid (which includes collecting and classifying the wounded, and the injection of antitetanic serum) and surgical treatment. In first-aid it is important (*a*) that all wounded should be seen by at least one M.O. before setting off for the C.C.S. (it is not always possible for the regimental M.O. to see all the cases, and there must be one M.O. behind him); (*b*) that the wounded should be collected in such a way as to facilitate evacuation; and (*c*) that once the wounded have received adequate first-aid the journey to the C.C.S. should be as rapid and uninterrupted as possible.

If we compare the relative advantages of the two systems, we see that—apart from the personnel—the

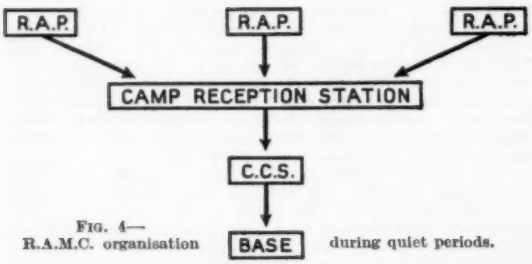


FIG. 4—R.A.M.C. organisation during quiet periods.

R.A.P. and A.D.S. of the English system correspond very closely to the R.A.P. and classification post of the Spanish. The position of the M.D.S., however, seems anomalous; all cases arriving at it have already received adequate first-aid and there is no possibility of adequate surgical treatment there. The M.D.S. thus merely seems to delay passage to the C.C.S., where surgical work (laparotomies, plastering of fractures) must be carried out before the wounded can be evacuated further. The object of the C.C.S. is to perform these operations as far forward as is compatible with safety. The R.A.M.C. solution is to have a large hospital some 25–30 miles back. This means a long delay before operation, and the distance adds little to safety when aerial attack is continuous. Its large size makes the hospital a good target and renders it relatively immobile. The Spanish solution was to have two or more small C.C.S.s (in the position of an M.D.S.) and to rely for protection from the air on their small size and their location in cave, tunnel or cellar. Depending as they did on surgical teams they were extremely mobile, and the number of surgical teams was easily adapted to the number of available sites.

QUIET PERIODS

During intervals of comparative quiet the R.A.M.C. organisation can be used as in fig. 4. The field ambulance reception station or hospital receives all men who cannot be dealt with by the regimental M.O. but who are not sufficiently ill to be sent back to the C.C.S. (cases of scabies, impetigo, influenza or tonsillitis). At most, a quarter of the field ambulance is needed for this work, and in England at present the C.R.S.s are staffed by V.A.D.s, 4 orderlies and 1 M.O., leaving the rest of the field ambulance M.O.s, other officers and men to wait and train. In England now men can be sent to the E.M.S. hospitals as well as military hospitals. In Spain, during such quiet intervals, the classification post and the C.C.S. disappeared and a field hospital was formed, usually from the personnel of the classification post and two surgical teams from the C.C.S. under the medical superintendent. This did the same work as the C.R.S. of the R.A.M.C., but also undertook emergency surgery and "cold" minor surgery. The rest of the surgical teams returned to the base and were able to treat the patients they had sent back after operating on them at the C.C.S. The R.A.M.C. plan has the advantage of maintaining the field ambulance in readiness for any need,

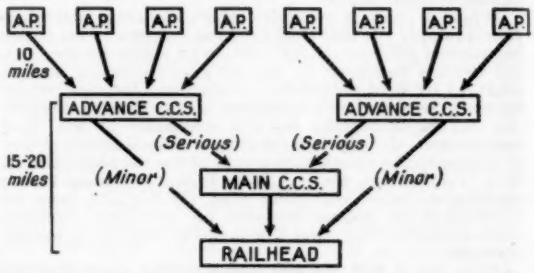


FIG. 5—Suggested modification of the Spanish scheme for use in England.

but it does not make the most economic use of doctors, nurses and orderlies. The Spanish plan keeps all the personnel occupied and the C.C.S. can be reconstructed within 8 hours.

PROPOSED SCHEME

The advantages of the Spanish system seem to be these.

1. Owing to the abolition of the M.D.S. and the use of small advance C.C.S.s the wounded receive adequate treatment earlier.
2. Owing to the organisation in surgical teams, the formation of C.C.S.s of various size and degree of specialisation is much simplified, and their mobility much increased. At the same time medical mobilisation is much easier, as is the interchange of medical personnel between military and civilian hospitals.
3. Thanks to the substitution of a field hospital for a field ambulance, unnecessary idleness of medical personnel is avoided.

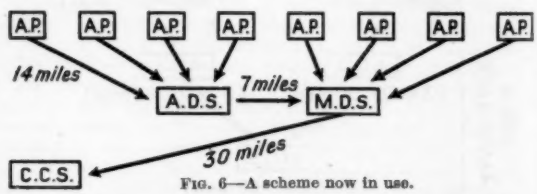


FIG. 6—A scheme now in use.

The position for the defence of England is, of course, different from that in Spain, but the Spanish organisation might be sufficiently adaptable to meet it. Owing to the coastal positions of battalions in this country, whence evacuation might prove difficult, it would be necessary to have probably more aid-posts per battalion, these requiring 3 or 4 ambulance posts. In such cases a classification post would be difficult to arrange and it would seem much better to use the personnel of the classification post to man the numerous aid-posts. This would involve bringing an advance C.C.S., with say 2 or 3 surgical teams, further forward and doing the classification of the wounded there. The increased number of doctors at the front would ensure that all wounded were seen by an M.O. before being sent to the C.C.S. The suggested scheme is shown in fig. 5; a

scheme in actual practice on our coasts is shown for comparison in fig. 6. It is clear from fig. 6 that a patient would have to travel about 50 miles and change ambulances twice before he could even have a fracture put up in plaster, let alone have a laparotomy. A C.C.S. near the front must be very mobile and placed in a well-chosen site, but the Spanish war showed that this could be done, and there seems little reason why it should not be done in England.

SUMMARY

The R.A.M.C. medical organisation was devised to suit the last war and involves two delays for the wounded (at the advance dressing station and the main dressing station) before they can get adequate surgical treatment.

The Sanidad Militar of the Spanish Republican Army was adapted to meet the conditions of aerial warfare and a rapidly moving front; it was founded on the idea of mobile teams (surgical, "triage," blood-transfusion, X-ray, kitchen) which were complete in themselves. Wounded were brought from the regimental aid-post to the classification post, whence serious cases went to the casualty clearing station and minor cases to the railhead and base. Surgical teams at the C.C.S. treated the gravely wounded and the rest of the wounded were evacuated according to priority. The C.C.S. could be set up in 8 hours and was placed much nearer the front than an R.A.M.C. station, more in the position of the M.D.S.

During quiet periods in Spain the classification post and C.C.S. were replaced by a field hospital staffed by the personnel of the post and two surgical teams from the C.C.S. The rest of the surgical teams returned to the base and treated the patients they had previously sent back.

In England the advantages of the Spanish plan might be attained by having the C.C.S. in the position of the present M.D.S. and abolishing the A.D.S., the latter's function being taken over partly by the aid-posts and partly by the rearward formations.

A WEEK-END OF INDUSTRIAL MEDICINE

THE short postgraduate course in industrial medicine held in the Birmingham Medical School on April 19–20 was attended by 30–40 practitioners who asked questions and made helpful contacts.

Dr. J. C. BRIDGE opened with a review of those sections of the Factories Act which concern the work of doctors in factories, giving them for a moment the semblance of life from personal experience. The doctor should, he felt, contribute more than he had hitherto done to the prevention of accidents, and therein lay the value of keeping records. A knowledge of factory legislation was essential to every doctor entering industrial work and in his field of work he could count on the coöperation of the Factory Department.

Mr. BEATSON HIRD from experience of thousands of injuries to the eye said that practically all of them could be prevented by better safety measures. He also gave details of first-aid and follow-on treatment. They did these things better in America. Proper intensity of illumination at work levels played an important part in the maintenance of health and production; evidence of this was an increase in recent months of cases of eye strain. In the discussion that followed it was suggested that Birmingham eye hospitals might do useful propaganda on the preventive side.

Mr. H. A. HEPBURN, H.M. inspector, South Midland division, surveyed the health hazards and preventive measures in industry from the beginning of the nineteenth century; only at the end of that century was the first medical inspector of factories appointed. He thought the industrial medical officer's familiarity with the processes and methods of work in his factory was a fundamental basis of success. He had to gain the confidence of the workers, to be tactful and persistent, and it was vital that he should be immediately responsible to the managing director or someone of like status.

Dr. G. A. AUDEN dealing with psychological factors in industry said we wished most of all in these days for a feeling of economic security. This security was implemented by the Workmen's Compensation and N.H.I. Acts, and by the insurance and pension systems which formed the framework of the working man's life. Personality was a screen upon which certain symptoms and signs were projected; worry, using the word broadly, was the inevitable background of psychological problems in industry as outside. Vocational guidance and selection had their value but were limited in scope at present; he instanced the tests for aptitude in certain engineering trades done in Birmingham during recent years. Good selection should cut down the high juvenile labour turnover so common in the Midlands. Accident proneness and the relationship of temperament to fatigue needed further research.

Dr. DONALD STEWART gave a demonstration, illustrated by lantern slides, on the organisation of a casualty department in a factory including A.R.P. This was the basis for efficient factory medical services, and made an immediate return in the reduction of absenteeism. In many factories accident-rates were increasing, and the recent large-scale introduction of doctors into factories gave a unique opportunity of assisting industry and the national effort. He discussed the lay-out and equipment of the ambulance room, the staff required for adequate service, the problems of hospital and general-practitioner treatment of accidents, rehabilitation, and difficulties arising with compensation cases.

Mr. HUGH CARSON discussed the treatment of burns, and summarised modern views on pathology, giving details of treatment for burns of all degrees and of the part to be played by the factory medical and nursing staff. All-important was the prevention of shock. Like other speakers he stressed the importance in these days of closer coöperation between factory doctor and medical and surgical specialists. The rapid expansion of factory health services was making it possible for the first time to apply present-day knowledge both to the factory clinic and to the rehabilitation of the worker.

WOMEN INTO INDUSTRY

THE calling up of women will put at the service of the country a great company of diligent hands. The prescription has been ordered, and we must see that it works, in the words of the master prescriber, safely, quickly and pleasantly. Otherwise it will disagree. Mr. Bevin wishes to make sure that worker and employer shall understand each other, and that difficulties which might arise from their inexperience of each other may be forestalled. A memorandum on the employment of women addressed to employers, works managers, superintendents and foremen, to be obtained from local employment exchanges, sets out a few steps which can be taken to make the assimilation of women into industry smooth and painless.

This leaflet suggests the appointment of a personnel officer, a woman who will be given an early chance to study the operations which women are to carry out and to understand the firm's organisation, wage rates, hours of work and—through the employers' federation and the unions—the method of regulating conditions of employment. She is to be responsible for interviewing and selecting women, and also for dismissing them. When newcomers are arriving from a distance she will arrange for them to be met and will engage billets for them; she will put them in touch with local organisations, provide them with all necessary information about hours of work and wages. She will also ensure that they have an adequate rest room, and she must coöperate with the firm's medical service to keep them well. An important part of her task will be to see that the canteen is equal to their needs. Women working until 6 P.M. or later have no opportunity to buy an adequate evening meal, because the shops have shut, and little energy left for cooking. It is essential, if they are to keep well, that the canteen should supply a square, balanced and appetising midday meal on such terms that they all take it. Some firms have arranged that dismissal should be carried out through the personnel department, and this plan is recommended. Sometimes dismissal can be avoided by transfer of a woman to another department, and sometimes a discussion with the worker of her side of the case may make it possible to see the difficulty in a new light. New candidates must be interviewed sympathetically and with the respect which an opportunity for mutual service should ensure: the employer needing labour and the applicant being willing to supply it. There should be no long waits in windy corridors,

no hungry delays during meal-times, no formidable and daunting forms to complete. Once appointed, the new worker is to be introduced to the forewoman, and commended to the care of a fellow worker for two or three days so that she learns her way about cloakrooms, canteens and strange departments. The highest turnover of labour occurs in the first month, perhaps in many cases because these simple civilities are forgotten. The personnel officer, it is suggested, should have a word with the new worker every day for the first week, twice during the second week and once during each of the succeeding weeks. A little friendly conversation can ease tension, discover objections and smooth the period of settling down.

Working hours for women demand realism. It is recommended that the maximum should vary between 48 and 56 hours a week, but schemes for part-time employment of women are suggested which are likely to be much more popular especially among those who are married. At present many women who are still looking after their homes are working 8 or 9 hours in the factory six days a week and then doing their housework in the evenings and on the seventh day, so that their actual working hours are much higher than the number credited to them. This can only lead to breakdown and loss of labour.

No mention is made in the memorandum of the training suitable for a personnel officer; normally these posts would be filled by workers who had taken a two years social science course, but to meet the urgent need for competent officers the Ministry of Labour has arranged special courses, lasting three months, for suitable candidates. Courses have already been held at the London School of Economics and the Universities of Liverpool and Birmingham, and have been completed by the first seventy candidates. New courses are now beginning at Liverpool and Edinburgh Universities. Candidates are chosen by a selection board of the Ministry from people on the supplementary register; as far as possible those with previous experience of industry are picked. All tuition fees and travelling expenses during training are paid by the Ministry, and candidates receive a maintenance allowance of 26*s.* a week while living at home and £2 10*s.* while living away. The first month of the course is spent in theoretical work, lectures and discussions; during the second month the candidate is attached to the personnel department of a factory and gains practical experience of the work she will have to do; she returns to the university for the third month to continue, with more insight, her study of industrial law, economic and industrial history, canteen management, selection tests, interviewing, heating, lighting and ventilation and problems in mental health. There is no examination, but she is expected to write a detailed report of her month of practical experience. The syllabus was drawn up by the Institute of Labour Management and the Industrial Welfare Society and accepted by the Ministry. An account of it by a candidate in training [1] seems to show that it covers the ground in a balanced and exciting manner.

MEDICINE AND THE LAW

Noise: An Injunction Refused

SOME weeks ago, in the Stourbridge county court, a plaintiff claimed damages and asked for an injunction because of the interference of a neighbour's noises with the comfort of his home. He went to bed, he said, at 10.30, as he had work of national importance to do by day; but his next-door neighbour's wireless loud-speaker, use of a piano and jazz drum, and hammering, sawing and chopping of wood was so excessive and unseasonable that he could get no sleep. In actions of this kind, as is probably well known, plaintiffs should keep notes of dates and times so as to present the court with detailed particulars of the alleged nuisance. The plaintiff did so; there was also evidence that he and his wife had required medical treatment for their nerves, though the doctor agreed in cross-examination that nervous affections which could be ascribed to the war, the blackout and the occasional gloom of broadcast announcements were not uncommon. The neighbour denied that his noises were unreasonable, and alleged that his house was empty at some of the times complained of.

The county court judge observed that he had to decide whether the use of modern instruments of music had infringed the rights of a resident in a modern semi-detached house. He had the guidance of the judgment of Lord Selborne in Gaunt *v.* Finney (1872): "it is not every occasional or accidental noise which will amount to a nuisance"; it is "emphatically a question of degree." The county court judge, bearing in mind the conditions in which most people are now living, dismissed the claim. "If my neighbour," to quote Lord Selborne again, "builds a house against a party-wall next to my own, and I hear through the wall more than is agreeable to me of the sounds from his nursery or his music-room, it does not follow—even if I am nervously sensitive or in infirm health—that I can bring an action or obtain an injunction." Such things, to offend against the law, must be done in a manner clearly exceptional and unreasonable. The courts have regard to the character of the neighbourhood and the ordinary use of neighbouring premises, as well as the time of the alleged noise, by day or night. The cases in which courts have intervened include those of building operations at night, the clatter of milk cans in the early morning, a shooting-gallery, a dance-hall and an amateur's incessant devotion to music. In war-time, since the legal issue is "emphatically a question of degree," the standard of toleration is possibly lower. The State, by regulations made under the Emergency Powers (Defence) Act, claims to restrict the remedies for nuisance due to war-work, although in the last war it was held (in Chester *v.* Bateson) that certain regulations made under D.O.R.A. were *ultra vires* if they barred the citizen's access to the courts. Perhaps it is not amiss to appeal for a little more neighbourliness in war-time. People who deliberately make noises to annoy the folk next door, and thereby seriously interfere with the comfort of the home, will find the courts as ready as ever to grant a remedy.

WAR RHYTHM ESTABLISHED

THE work of the London School of Hygiene and Tropical Medicine, though thrown somewhat out of gear by the war, is now settling into an effective pattern. The report for 1940 tells of the whole staff of the department of bacteriology, and some from the department of biochemistry, released for work in the Emergency Public Health Laboratory Service, which indeed would have been difficult to organise at the outset but for this loan of expert personnel. Plans had been made to transfer some departments of the school to Cambridge, but this has not been necessary. For convenience the department of parasitology has removed to the Institute of Agricultural Parasitology at St. Albans, an event which has had sad repercussions among the snails. Molluscs always expect to be waited on with keen devotion, if not hand and foot; of the fine collection belonging to the school, half were transferred to St. Albans, liked it not and died; and most of those left behind succumbed resentfully on losing the skilled care of Mr. William McDonald. They will be regretted by all taking courses in helminthology. Normal courses of instruction were suspended in the autumn of 1939, but two intensive six-week courses in hygiene and tropical medicine were given during the year and were well attended; short courses were also arranged on malaria for Service medical officers, and on industrial hygiene for welfare workers. In October, 1940, the full course for the diploma in tropical medicine was begun again. The biochemical department was gravely interrupted by an order in September, 1939, to get rid of all inflammable solvents. Later it was possible to replace these reagents in small quantities, with suitable safeguards against fire. Collaborative work on immunological chemistry had to be given up because of the incorporation of the staff of the department of bacteriology in the E.M.S. The work of the Ross Institute—practical advice to governments and industrial undertakings overseas and to commercial companies at home, as well as research and teaching—has been well maintained, and Dr. G. Macdonald, the assistant director, was put in charge by the Army Medical Department of the first anti-malaria unit to be sent out of this country.

1. O'Donovan B. *Labour Management*, April, 1941, p. 53.

In England Now

A Running Commentary by Peripatetic Correspondents

ON this headland winter loiters till the snow leaves the hills to lurk only in the deep corries, and war is never remote from a seaport town these days. Winter and war together made keen the prospect of a few days in the warm south. Not that work has been dull, for besides new jobs there have been some intriguing problems in the daily round and one in particular which had to wait solution till the end of the holiday. It all started when a suspicious obstetrician questioned the honesty of one of the best foster-mothers to the hospital. Here was a woman who was supplying a profuse ration of human milk at a mere twopence an ounce to the hospital and doing a job of work which in veterinary circles at least would have been hailed as a record. But prodigies are suspect, and she was doubted because the quantity of milk was unphysiological and because the baby who was receiving the milk wasn't doing as well as the obstetrician hoped. But there it was, the astounding bottle of milk arriving daily, smelling and looking like fresh human milk, but in the eyes of authority curdled and sour. And so off it went to the biochemist with the brief, unpleasant note " ? cow's milk." To the biochemist it looked simple, for had he not his protein, fat and sugar contents to juggle with ? Humans and cows haven't yet agreed to standardise these fractions for the duration. At this stage someone spilt the poor woman's own story to the biochemist and he responded with all sorts of technical difficulties. The milk he said might be simply watered human milk or a mixture of human and cow's milk or just cow's milk with the sugar and other things sabotaged. Besides, the tests weren't conclusive and who was to condemn a decent woman on suggestive tests ? With the glad heart of a man who has done his work well the biochemist passed the buck to the pathologist who with less opportunity for scientific quibbling began to interest himself in the motives for this rare outflow of precious fluid. The obstetrician's cynical theory that the twopence per ounce was important could be dismissed at once, but a hint that the lady had previously come near to the record was a good lead. No doubt she remembered the hospital's gratified delight during the former peak of production, and it was time for a new draught of pleasure. Reluctantly the rabbits were injected and at this point my holiday began.

London seen for the first time in two years didn't cause surprise—it was so familiar that one might have been living there all the time. The cinema has dulled the edge of fresh visual impression. How much has that series of anti-war films of the 1930's contributed to the calm strength of Londoners ? Instead of instilling the dread of war into folk, it seasoned them to sights of horror and devastation, and many of the people I met talked and acted as if they were actors in a gigantic play. The bobbies joked about the time-bombs, and the street cleaners swept and shovelled with an air of secret pleasure. Consciously or unconsciously they feel they are working with the whole nation—much of the world in fact—as an audience. It is only on the folks who sit at home and on those who have just felt disaster that the real grimness presses. It will be another Sassoon rather than another Hemingway who will write a true picture of the battle of London for folk to come.

In Berkshire life was pleasant, and riding over the waste downland with a stable-man who spoke of a good horse with " the head and neck of a duchess and the rump of a cook " it was joy to hear of crops and magpies and the lost art of thatching. Riding on the straight Roman road, " bare, like the thin parting-line in hair," it was comfort to think of the dynasties that this simple lane had outlasted. In the Barley Mow I learned that the big doctor who lived down in the valley was in town having two teeth pulled, and I shared the pleasure of the teller who revelled in the thought that the great folk had to suffer just like us. Down at Ye Olde Lanthorn, in the market town, the retired surgeon-commander's face changed its mahogany serenity only once to tell how interlopers from the city had caused pink gin to be rationed and thereby scuttled his staple diet ; but he soon brightened to the irrelevant and far-off tale of how his ship sank at Jutland. The peace of Berkshire and the home counties had done its work, and not even the sight of more fish in the shops of the Thames resorts than we had seen in weeks at our own great fishing port could make us angry. In the northbound train a Canadian sergeant drank to the damnation of all mountebanks in governments and offices, and to the day when those who did a real job of work would get their due reward. And as the train curled round the leaden bay at home we remembered the patient merit of the foster-mother who had tried so well, only to be scorned by the insolence of office. Alas, the milk she had so generously supplied seemed from the serological tests to have a bovine as well as a human origin. Depression was set for the bottomless pit when the lab. boy suggested that it would be the most natural thing in the world for a woman to keep the milk in an ordinary milk-bottle. Our reputation for kindliness as well as accuracy had been saved and over the clean city the spring sun began to filter through.

* * *

My friend the surgeon uses a stethoscope occasionally and keeps it in his bag. Recently he had to leave the end-piece at the shop for repair because the vulcanite bell was broken ; then he forgot all about it. Some time later he saw a patient in his consulting-room, and it became clear that even a surgeon must examine his chest and take his blood-pressure. He opened the little drawer in his ingeniously constructed bag, and pulled out the binaural ear-piece from which dangled forlornly two lengths of rubber tubing. He was not nonplussed. Once more he delved into the bag and, emerging with two aural specula, carefully inserted one into each dangling end of rubber. As he moved about the room, they jingled as charmingly as cow-bells in an alpine pasture. The stethoscope, being now bimanual as well as binaural, was effective enough in auscultation of the heart and lungs, but took some manipulation in determining the blood-pressure. However, the task was well and truly done in the end. These easy triumphs, I fear, went to my friend's head. Full of enthusiasm at his triumphal though primitive invasion of the sphere of the physician, he recalled other great auscultators who despite simple tools blazoned their names on the page of history. He remembered Laennec, he did not forget Skoda. Seizing each shining little silvery bell, he placed one in the right axilla and the other in the left, and listened with a growing wonder. I cannot but think that this was a moment of initiation ; that from that hour, like Lydgate in George Eliot's " Middlemarch," he must have felt the growth of an intellectual passion. " The moment of vocation had come, and before he got down from his chair, the world was made new to him by a presentiment of endless processes filling the vast spaces planked out of his sight by that wordy ignorance which he had supposed to be knowledge." The patient was deeply impressed.

* * *

In the country road where we live we all keep dogs ; and such is modern dog-snobbery that they are all well-bred dogs, mostly large. Mr. Bale's Alsatian starts the row, young, debonair, elegant, coloured like a Jersey cow ; then there is Mr. Chives's golden retriever, harmonious, easy, moving like oil ; next comes our Porkie, black as the devil, a Staffordshire bull-terrier, blunt-nosed, solid, foolish and conciliatory. Miss Treacher's Chris, a fat spaniel, owns the next garden, and then there is Mrs. Cummings's cat, Frederick, who is practically a dog and goes for walks with her. At the end of the row are two or three rather worthy Aberdeens ; there is thus a decline in gross volume, though not in blood or dignity as you pass along the line. We thought of having a dog show; not on breeding—for who shall judge between these appalling aristocrats ?—but on qualities of disposition, personal charm, humour and effrontery. The general feeling was that Porkie would do well on every human quality except intelligence, Chris would display the advantages of an enlightened self-interest, the Aberdeens would prove cautious and reliable to a dog, the Alsatian would cash in on his manners, the retriever on his bonhomie, and that Frederick would sneer. We thought of leading them out one fine May morning, care and war set aside, into a neighbouring meadow and getting down to brass tacks —Mr. Bale, plump and cosy behind his sauntering apollo

of a dog; Mr. Chives fresh from the furrow, a clod with a cosmopolitan; Eve panting after Porkie, a gnat straining at a tank; Chris shuffling unwillingly, a stout pantaloon, behind Miss Treacher's tweeds; and the Aberdeens importantly convoying their naval owner. Frederick, we thought, would sit on the fence. But it was Eve who suggested that the dogs ought to show us. To comfort ourselves for our lack of class when compared with our hounds, we pictured them as keen partisans of our other merits. Mr. Bale's Alsatian will probably mutter warmly: "Not much to look at perhaps, but a one-dog man, and what a nose for a bone." The retriever, talkative, vivacious, agreeably aware of himself, would laugh off Mr. Chives as a chosen weakness. "Terrible creature, I know, but simply marvellous at a rat-hunt, and a beautiful shot. I'm completely devoted to him, my dear, so raw, fundamental—he actually wears combinations. Talk? My God no, simply dumb. Uncouth, do you know? Giaour." Chris with his comfortable old man's wink would grunt: "Good cook. What more do you want?" And the Aberdeens would rumble sentiments on patriotism with appropriate quotations from Burns and Scott. Frederick would mince out: "Owner? The word means nothing. All this possessiveness is quite fantastic. I believe in self-determination, naturally. One could scarcely take part in this sorry affair, but one must confess it has its qualities as a spectacle."

And Porkie, what would he do about this family, so little to his credit? When he had starched our crests and powdered our noses (the women) and pressed our flannel bags and twitched our ties (the men) I can see him looking round wistfully and swinging a doubtful tail. "They go walks, sometimes," he would urge hopefully, "and they keep up a good fire——" It will be no use. I can see the amused scorn in the eyes of the retriever, the Alsatian, the Aberdeens and Chris; the cold contempt in Frederick's "What a dreadful bunch of tykes. Poor old Porkie! Where did he pick them up?"

* * *

The morning after a blitz on London I went past a church within a yard of which a bomb had fallen, killing several people. One has got so used to tumbled stone and twisted iron and blackened ruin that one no longer reacts as at first with sorrow and indignation, but with a certain amount of callous interest. I went through the same stages when as a student I first saw the grosser forms of illness. A fungating carcinoma then inspired horror and anger and only when one had become habituated to such brutalities and realised how impotent one was to frustrate them could one get that emotion-repressed detachment that is the parent of keen interest. There had been thick iron railings round that church at a distance from it of about ten yards. Nearest the crater they had simply gone, further away they were partially destroyed, further away still a railing here and there had a few inches missing. Some flaw in the metal? Some concentration of the blast? Twenty yards away from the crater there was a window unbroken, seventy yards away many had been sucked out or blown in. The apparent capriciousness of blast can often be accounted for, if one takes the trouble to reason the matter out. In the churchyard nearer the crater than some of the partially broken railings I saw among other shrubs a common Darwin's barberry in flower. I nipped over a rope and some rubble and examined it. Some of the flowers were open, and lying close to the petals were the delicate stamens. With a shred off my match-box I touched the base of one of them, and it sprang in. This trigger mechanism had survived within a distance that had proved too much for stout iron. Moral: bow before the blast. Yes, but bob up again.

* * *

With our daily papers down to four pages with an occasional six as a treat, or eight if you can run to 3*d.*, and material for them as plentiful or more so than ever, there can never have been such blue-pencilling as in these last few months. Yet things were pretty bad two hundred years ago. "The valuable article which I sent to the publishers for sordid gain," wrote William Oldys the antiquary somewhere in the 1750s, "was so compressed and played the Devil with by one John Campbell that it was reduced to one sheet instead of two." Poor William.

Letters to the Editor

GLANDULAR FEVER

SIR,—I have read with interest the two articles on mononucleosis and glandular fever, by Dr. Fuller and Dr. Barber, which appeared in THE LANCET of Jan. 18 (pp. 69 and 71) with an editorial note (p. 84). In discussing some of the questions which these papers raise I will use the American nomenclature, for here we are at present wedded to the term infectious mononucleosis. Dr. Fuller has listed three cases, which presented many of the clinical features of infectious mononucleosis and yet all failed to give a positive heterophile antibody (sheep-cell) test. This finding reflects an experience which we, and others in this country, have frequently encountered. In fact an unusual report by Erf (*J. Mt. Sinai Hosp.* 1938–39, **3**, 113) states that in not more than 40% of their cases of infectious mononucleosis was a positive heterophile antibody test obtained. In our own clinic, on the other hand, 90% of fifty cases have given a positive test (*Bull. N.Y. Acad. Med.* 1939, **15**, 43). Obviously the discrepancy is dependent on the clinical diagnostic criteria used in these different clinics, as well as the frequency with which serological tests are made during the disease. The question whether there should be a separate category for cases which resemble infectious mononucleosis clinically and yet have negative heterophile tests is often discussed in this country; but until more definitive diagnostic criteria are available it does not seem as if much would be accomplished by dividing them into separate groups. Our personal and present opinion with regard to the heterophile antibody test as a confirmatory diagnostic measure in infectious mononucleosis is that (provided one can exclude serum disease) an agglutination in a dilution of 1/64 is nearly always of positive diagnostic value, and a test of 1/32 is of suggestive value, but a negative test does not eliminate the diagnosis of infectious mononucleosis.

Two of Dr. Fuller's cases (cases 4 and 5) were probably examples of serum disease, and as he points out the serological findings in such cases are explainable on the fact that horse serum contains the Forssman antigen. This type of heterophile antibody can be differentiated from the infectious mononucleosis antibody by absorption tests such as those described by Beer (*J. clin. Invest.* 1936, **15**, 591) and Davidsohn (*J. Amer. med. Ass.* 1938, **108**, 289). The blood-counts in Fuller's cases 3 and 4, which reveal a relative lymphocytosis, are more difficult to explain but at least we have seen blood-pictures of this type in cases of throat infection in which horse serum was given. In the editorial note on this subject the question is raised whether the use of sulphonamide drugs may not suppress antibody formation in the disease under consideration, as they do in pneumonia, and whether that may not be the reason why the heterophile antibody response was absent in some of Dr. Fuller's cases. This is a conceivable possibility, of course, although there seems to be some recent difference of opinion on this point too (*J. clin. Invest.* 1940, **19**, 179, 307, and 735). At least it may be worth mentioning, however, that cases of infectious mononucleosis with negative serological findings were often noted prior to 1936—that is, prior to the introduction of the use of sulphonamide drugs in this country. Professor Himsworth (*Lancet*, Feb. 8, p. 195) suggests that the extent of the monocytosis in these cases may be related to the extent of the heterophile antibody response. American students of this disease will look forward with interest to subsequent findings on this point.

Yale University Medical School. JOHN R. PAUL.

INFECTED DUST

SIR,—I am sorry to read in your issue of April 19 that Dr. Glass has doubts about the power of the formalin spray to remove hæmolytic streptococci from an infected room. I am particularly interested in this, as I was working with Dr. White at the time she obtained the satisfactory results quoted by Dr. Glass, and since then I have myself done many experiments, all of which confirm her findings. I will not give my full results here because they will be published shortly in detail, but I have no doubt that a pint of 40% formaldehyde, intro-

duced into a room of about 1000 cu. ft. as a fine spray and left there for 24 hours, should kill all hæmolytic streptococci, even when they are hidden in the most awkward nooks and crannies. Dr. Glass's room was slightly larger (1462½ cu. ft.), but as the figure of 1 pint for 1000 cu. ft. allows a good margin of safety I think it should still have been quite satisfactory.

There is, however, one possible source of error. I read that "during the spraying the windows and doors were tightly shut," and that "after the spraying the ward remained closed for 24 hours," but there is no mention that the ward was properly sealed. For success it is essential that all the windows, door frames, ventilators, and any other opening should be sealed by covering all possible cracks with strips of gummed paper. The flue, if there is one, must not be forgotten, nor must the keyhole be overlooked. The formalin spray acts, not as a solution of formalin, but by virtue of the gaseous formaldehyde which is quickly given off when the surface area is so enormously increased by the act of spraying the liquid. This gas diffuses everywhere readily, and owes its power of sterilising most difficult corners to this diffusion. Because of this diffusibility it will escape from the room if given any opportunity, and every crevice through which it can escape must be sealed. If this is not done, it is impossible to say for how long a time a lethal concentration of formaldehyde remains in the room, but it may be very short.

If I am doing Dr. Glass an injustice and the room *was* actually sealed in this way, then I can only conclude that his formalin may have been weak. A bottle, once opened, soon loses strength, and for this reason I always prefer to use paraformaldehyde powder, which can conveniently be heated on any tin tray over a spirit lamp. One gramme of this for every 10 cu. ft. will give an adequate concentration.

Carmarthen. R. M. FRY.

DEFIBRINATION: TRANSFUSION SIMPLIFIED

SIR,—With reference to our article of March 22 (p. 405), we find that serum can be recovered from defibrinated blood without the use of a centrifuge. In order to obtain satisfactory settling of the corpuscles by gravity it is only necessary to dilute defibrinated blood with from 7 to 8 times its volume of serum. If clotted blood is the chief source of serum, half a bottle of defibrinated blood (240 c.cm.) can be added to each Winchester of serum separated from bottles of clotted blood. It is convenient to use the screw cap with spout and tongue described in THE LANCET of April 26 (p. 536) to hold back the clot and the glass beads while pouring off the defibrinated blood. Sedimentation of the corpuscles is virtually complete in 96 hours at 2–6° C.

Regional Blood Transfusion Laboratory, Cambridge. G. A. HARRISON. L. E. R. PICKEN.

A HUNDRED CASES OF BREECH PRESENTATION

SIR,—Drs. Gairdner and Jackson in their reply to Mr. Burns ask for further information about the figures he quoted. The figure he gave of fœtal mortality for vaginal delivery of uncomplicated breech presentation at the Liverpool Maternity Hospital was not corrected in any way. Breech presentation is classified in the hospital reports according to the recommendation of the subcommittee set up by the Royal Society of Medicine and therefore includes all cases of breech presentation where the baby weighs 5 lb. or over and where there is no other obstetric complication. The fœtal mortality includes all babies dying during labour, during delivery, or during the neonatal period—i.e., until the discharge of the mother from the hospital.

During the eight-year period quoted 462 uncomplicated breech cases were delivered with the loss of 30 infants; but of these 7 died from causes unconnected with the presentation. During the same period there were also 163 cases of uncomplicated breech delivery in multiple pregnancy from which no child was lost. The "corrected" fœtal mortality for the 625 cases would therefore presumably be 3·68%. The hospital however prefers to quote the uncorrected figure for fœtal mortality in breech presentation—viz., primigravidæ 6·23% and multiparæ 5·5%.

Liverpool Maternity Hospital. MARY MAYEUR, Resident Obstetric Assistant.

BONE GRAFTING THE SCAPHOID

SIR,—Squadron-Leader Armstrong's contribution in your last issue to the treatment of fractures of the scaphoid bone is of particular importance at this moment, because the injury is so often sustained by pilots and skilled technicians of the Royal Air Force, and no doubt also by members of the other fighting Services who are drawn from the same age-group. Furthermore the time factor in the treatment of these injuries is now of vital significance, and any measure which offers hope of accelerating recovery is worthy of serious consideration.

In an annotation (p. 546) you quote the views which I held when last I wrote upon this subject. I then believed that bone grafting was indicated only in a small number of fractures with established non-union, and not in fractures with "cavitation" and decalcification in which union could be secured with no less certainty by plaster immobilisation alone. I still believe that simple delayed union can be treated successfully by adequate and continued immobilisation in plaster, but if it can be shown that union is accelerated by the increased immobility of a well-placed bone graft, then military necessity dictates that this shall become the treatment of choice. During the last twelve months I have had many opportunities of seeing Armstrong's work, of watching the treatment of similar cases in the hands of other orthopædic surgeons of the Royal Air Force, and of myself employing the admirable technique he has developed. There is now a growing volume of evidence which suggests that a skilfully performed operation may reduce the incapacity period, and I hope that it will soon be possible for Armstrong to report a much larger series of cases.

Meanwhile, however, it must be recognised that the bone-grafting technique demands a high standard of operative skill, that it necessitates perfect team work, and that it cannot be performed without special apparatus and facilities for radiography in the operating theatre. Without these amenities it is better that delayed union of fractures of the scaphoid bone should be treated by the equally certain if somewhat slower method of adequate and continued immobilisation in plaster.

Liverpool. R. WATSON-JONES.

THE CASE FOR MASS RADIOGRAPHY

SIR,—The impression conveyed by your leader of April 19 is that mass radiography is a reliable routine method of examination of recruits for the Services or even of communities. There are a number of reasons why many of us would disagree with this.

(1) Radiography is an ancillary investigation which should not be applied unless an adequate clinical examination indicates a need for it. It is the clinical condition of the patient and not the radiographic appearances which matter.

(2) Miniature radiography is unreliable in its negative findings and inferior to ordinary direct radiography. The screen image can be clarified by the use of a focused grid between the patient and the fluorescent screen, and the thin metallic strips of the grid will not be seen on the screen or shown on a miniature photograph of its image *because of the blur effect of the screen*; but the grid cannot be left in place for direct radiography because the lines of the grid would be too conspicuous. Surely, if the detail of the metallic grid can be blurred out from the miniature but clearly shown on the direct radiogram, the detail of disease shown on the direct radiogram will also be blurred out. Many times I have been astonished to see on the direct radiogram definite evidence of miliary tuberculosis and other lesions of the lung of which the screen image had given no suggestion. Even with the best radiography it is my experience that clinical signs precede radiographic in at least as many cases as radiographic precede clinical.

(3) A fair proportion of the positive findings with miniature radiography were found to be fallacious. Though they may be of no clinical significance an extended and expensive clinical and radiographic examination will be necessary to establish this.

(4) The comparison of the two methods should be between the direct film and an enlargement of the miniature photograph of the screen.

(5) Mass radiography is used as a substitute or a refuge for poor clinical work. Radiographic evidence in

recent papers is of extensive disease with large cavities and fibrosis which had been missed at the clinical examination. In another account 50% of the patients with positive miniatures had tubercle bacilli in their sputum.

(6) Mass radiography is more spectacular and, with its full commitments, more expensive but less reliable than mass examination of the sputum.

For these reasons I would strongly deprecate the expenditure of public funds on mass radiography.

Birmingham 15. JAMES F. BRAILSFORD.

ESERINE AND PROSTIGMIN

SIR,—An interesting series of experiments, reported in your issue of April 12, has led Denis Williams and Ritchie Russell to the conclusion that eserine diminishes epileptic activity whilst Prostigmin increases it. This work is of considerable importance and I should therefore like to draw attention to a factor which may possibly have vitiated the results. The anti-cholinesterase activity of these two drugs appears to be implicated. If that is the case the use of these drugs in myasthenia gravis might give some indication of comparable relative dosage. In that disease 0·5 mg. of prostigmin gives results as good as or better than those obtained with 2·5 mg. of eserine. In their experiments, Williams and Russell have used chiefly 1·5 mg. of prostigmin, which probably corresponds to 7·5 mg. of eserine, whilst they used only 1–2 mg. of eserine in most of their cases. I suggest that, were they to repeat their observations with 0·5 mg. of prostigmin, the result might well be a decrease in epileptic activity comparable to the action of the small doses of eserine they used.

It is perhaps significant that two of the patients treated with eserine in doses sufficient to cause toxic symptoms (3·5 mg. in a man and 1·5 mg. in a boy of 13) showed an increase in epileptic activity. This suggests surely that the action of eserine varies with dosage and may be reversed when larger quantities are used. Conversely, I believe that prostigmin might, in smaller doses, give results opposite to those obtained so far with larger doses. In two experiments Williams and Russell gave first 1·5 mg. of eserine, producing a decrease of epileptic activity, and then injected 1·5 mg. of prostigmin, altering the decrease to an increase. I think that prostigmin 0·5 mg. followed by eserine 1·5 mg. might have had the same result.

Finally I should like to mention the case of a myasthenic woman of 28 who had epileptiform convulsions for the first time whilst taking prostigmin 7·5 mg. daily in divided doses. As I did not suspect any connexion with her treatment, the injections were continued; the fits ceased after a few months and have not recurred, although she still takes prostigmin in the same doses.

Park Prewett Hospital, Basingstoke. L. P. E. LAURENT.

EXPERIENCES OF BLAST

SIR,—You may recall my account of the policeman who was blown some fifty yards by the explosion of a very heavy bomb (*Lancet*, April 5, 1941, p. 461). He has survived, and his story is that he was trying to locate on or about a particular building an unexploded bomb which had been reported in the usual way. He estimates that he cannot have been more than ten yards away from it when it went off. The explosion burst one of his ear drums, but there was neither clinical nor radiological evidence of any blast injury of the lungs.

Another interesting blast "incident" was described by the man who experienced it. A heavy bomb exploded about 200 yards away while he was walking in a moderately wide street. He found himself lifted off his feet, and his chest felt as though it was being squeezed most painfully, so that "all the blood was being displaced to my head, making it throb badly." The effect was quite momentary.

YOUR PERIPATETIC.

Dr. F. R. Humphreys asks on behalf of the Thunderstorm Census Organisation if readers would send him details of any cases of injury to human beings from lightning. The information will only be used for statistical purposes by the organisation. Dr. Humphreys may be addressed at Langley Terrace, Oakes, Huddersfield.

Parliament

IN the House of Commons on April 22, Mr. JAMES GRIFFITHS raised the case of a young man named Thomas of Llanelly who was passed into the Army A1, though in 1930 he had had a mild attack of rheumatic fever. After three days' service in the Army he broke down and after some months in hospital was discharged as unfit, suffering from mitral stenosis. Till he was called up Thomas had worked for nearly eight years as a grease burner, doing hard and strenuous work in front of a furnace with only a week and a half's sick leave for influenza. On the advice of his medical advisers the Minister had decided that this young man's disability was not caused by his service in the Army or materially aggravated by it and he had received no pension. Mr. Griffiths said that if this case had happened in industry the man would have received compensation. He urged the Minister to set up an independent tribunal to deal with these cases. In reply Sir WALTER WOMERSLEY, the Minister of Pensions, admitted that the Britisher gets some satisfaction from knowing that even though a tribunal is not a competent one he has had a hearing for his case, but in the present shortage of doctors it would be impossible to get the right men to serve. In Thomas's case he found there was a difference of opinion between the man's own doctor and not only the Ministry's doctors but also the medical board who found that the man's condition was not aggravated by his service. Therefore he submitted the case to a medical specialist nominated by the Royal College of Physicians who had not thought it necessary to examine the man but after considering the medical evidence had reported that stenosis was caused by rheumatic fever in early life and that provided that the heart was little affected it might be present with little symptoms of heart disease and the patient might be able to live for years an ordinary life, even one involving manual labour. On medical examination the signs of this disease might be overlooked. When the characteristic murmur and thrill were well marked (as in Thomas's case) the valvular defect was probably of considerable standing. He advised that the illness made the heart condition worse, but it was a case of worsening irrespective of the service the man had performed.

Sir Walter Womersley said, at the beginning of the war many men who ought never to have been taken into the Forces were accepted. But the examination was now much stricter; and he was pressing for an even stricter one. Where men had failed to disclose previous illnesses there was some excuse for a doctor grading them as A1. But Mr. Thomas on enlistment gave a history of rheumatic fever in childhood and yet was placed in Grade I. That seemed to be one up against the doctor. He did not believe that there was widespread trouble over these cases. It was astounding to him how few they were, considering the rather slack examination in the early days.

Sir Walter also emphasised the importance of "salvaging" the men who are discharged. Many are able to return to civilian life and work, and as we pointed out last week (p. 543) rehabilitation is more than ever wise and thrifty.

LITTLE AND OFTEN

When the Budget resolutions came before the House of Commons on April 23 Sir GEORGE DAVIES pointed out the danger that heavy taxation on the wealthy classes would have a serious effect on the financial support given to great charitable institutions such as voluntary hospitals. In reply Sir KINGSLEY WOOD admitted the burdens he had imposed but said he comforted himself with the reflection that the help which had saved so many hospitals did not come from large gifts of money by individuals, but from regular week-to-week contributions made by large sections of the community all over the country. Much as he would regret the withdrawal of subscriptions to hospitals, he was therefore not unduly apprehensive.

In an answer to a question Mr. BROWN said: The number of deaths from cancer in England and Wales registered during 1939 are provisionally returned as 69,001.

QUESTION TIME

Distribution of Medical Man-power

IN reply to a question Mr. E. BROWN said that the committee appointed to advise on the distribution of medical man-power between the civil and fighting service and general medical practice had made the following recommendations:

All medical establishments, service or civil, should be reviewed forthwith with a view to the fullest possible utilisation of medical personnel and the reduction of future demands.

The services of civilian practitioners in proximity to troops might be further extended.

Where the three Services in this country are represented in the same or adjacent areas, further economy should be effected by the adoption of the principle of area service.

The possibility of temporarily releasing practitioners from the Services for civilian work through the winter months when the demands of the civilian population are greatest should be carefully examined.

The employment of alien practitioners admitted to the register in civil hospitals and the Services should be further extended.

The employment of final-year students as house-surgeons or house-physicians in civil hospitals should be set on foot.

The question of the employment of more practitioners from Canada and other Dominions should be further explored.

The possibility of recruitment of practitioners from the United States of America is a new factor and action in regard to it should be taken as quickly as possible.

An effective organisation for the settlement of questions of priority should be established.

E.M.S. Hospitals

In answer to a question Mr. BROWN said that under arrangements agreed with the war organisation of the British Red Cross Society and Order of St. John of Jerusalem 163 houses with 8454 beds have been opened, and 52 more with 2531 beds are in preparation, as auxiliary or convalescent hospitals for the Emergency Hospital Scheme. In these houses 2795 beds are at present occupied, but instructions to bring more beds into use are being issued. The usefulness of these hospitals, however, does not depend only on the present occupancy of beds. They are required to relieve the main hospitals of suitable types of patients, as and when the pressure on beds develops.

Essex County Sanatoria

Mr. T. E. GROVES asked the Minister of Health if he was aware that at the outbreak of war there were 70 patients waiting to be admitted to Essex County sanatoria, and that since the war the figure had increased, and patients kept waiting two or three months; how many patients, both male and female, were at present waiting; what steps were taken to prevent the disease being spread by these patients; how many patients discharged themselves from Essex County sanatoria in 1940 before treatment was completed; and what steps were being taken to ensure an adequate number of beds in the county in future.—Mr. BROWN replied: I am informed that at present 114 persons in all are on the waiting-list. In many cases immediate admission is not required, but for those in which it is desirable every effort is made to secure sanatorium treatment as soon as possible. The spread of the disease is controlled by the normal measures of supervision in the patient's home and by giving priority in admission to those whose segregation is desirable. A certain number of patients discharge themselves from county sanatoria against medical advice before completion of the necessary sanatorium treatment, but I have no information as to the numbers concerned in 1940. An additional institution of 300 beds has been brought into use since the outbreak of war.

More Pay for Service Nurses

In a written reply to Miss WARD, Captain MARGESSON, Secretary of State for War, announced the following improvements in the scale of pay of the nursing services, which take effect from April 1, 1941:—

The minimum rate of pay of a sister, Queen Alexandra's Imperial Military Nursing Service, is being increased from £80 to £95 a year, and sisters whose rates are below £95 will be brought up to that figure. Annual increments of £5 a year for future approved service will be admissible as heretofore and the sister's maximum will remain £125 a year.

For members of Queen Alexandra's Imperial Military Nursing Service Reserve, the Territorial Army Nursing Service, and the Territorial Army Nursing Service Reserve, the minimum rate will be £105 a year. Members of these services who have civilian nursing experience will also be allowed certain special increments. Increments of £5 a year on the scale for each year's approved military service rendered hereafter will also be admissible subject to the over-all maximum of £125 a year.

Similar increases have been made in the scale of pay of members of the R.A.F. nursing services.

Food Examination and Public Health

Captain L. F. PLUGGE asked the Minister of Health whether any supervision was maintained over the component parts of such commodities as fish cakes, meat and potato pies, luncheon and breakfast sausage, meat rolls, meat pies, egg dishes and other articles in which there was little content of the article advertised.—Mr. BROWN replied: The Food and Drugs Act, 1938, gives wide powers for the sampling and examination of food, both for the protection of the purchaser and in the interests of public health. These powers extend to the ingredients of any article of food whether on sale or in possession for the purpose of preparation for sale. The administration of the Act rests with local authorities, and I have no reason to suppose that they are not maintaining adequate supervision.

Diet for Diabetics

In reply to a question Major LLOYD GEORGE stated that on the recommendation of the food rationing (special diets) advisory committee of the Medical Research Council, the Minister of Food had arranged for diabetics to receive two extra meat and two extra butter and margarine rations per week in lieu of their sugar ration.

Coalminers and Silicosis

In replying to a question Mr. HERBERT MORRISON gave particulars of applications to the medical board for certificates under the Various Industries (Silicosis) Schemes from Coalminers, 1940, as follows:

—	Total number	South Wales, excluding anthracite mines	Anthracite mines
Disablement or Suspension—			
Applications for certificates	957	353	472
Certificates granted :—			
(1) Total disablement ..	185	91	71
(2) Suspension (with partial incapacity) ..	282	78	189
Deaths—			
Applications for certificates	137	84	32
Certified as due to the disease	93	58	18

Notices in the Medical Press

Mr. GROVES asked the First Lord of the Admiralty why the notice to civilian medical practitioners, called in to attend naval ratings, was only inserted in the *British Medical Journal* and the *Lancet*; when was the notice published; and what was paid to each paper.—Mr. A. V. ALEXANDER replied: I understand that most medical practitioners read one or other of these papers. The notice was published on March 8 and no payment was made.

Deaths from Tuberculosis

In reply to a question recently addressed to him, Mr. E. BROWN, Minister of Health, stated that the number of deaths from tuberculosis (all forms) registered in England and Wales for the second quarter of the year were:-

Year	Males	Females	Total
1940 ..	4027 ..	3089 ..	7116
1939 ..	4027 ..	2836 ..	6863
1938 ..	4150 ..	2823 ..	6973
1937 ..	4256 ..	3117 ..	7373

Infectious Disease in England and Wales

WEEK ENDED APRIL 19

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1056; whooping-cough, 3568; diphtheria, 877; enteric fever, 26; measles (excluding rubella), 13,951; pneumonia (primary or influenzal), 1156; puerperal pyrexia, 147; cerebrospinal fever, 326; poliomyelitis, 7; polio-encephalitis, 0; encephalitis lethargica, 3; dysentery, 131; ophthalmia neonatorum, 78. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on April 18 was 1760, including: scarlet fever, 223; diphtheria, 368; measles, 391; whooping-cough, 338; enteritis, 29; chicken-pox, 86; erysipelas, 50; mumps, 12; poliomyelitis, 1; dysentery, 30; cerebrospinal fever, 60; puerperal sepsis, 9; enteric fevers, 8; German measles, 8; encephalitis lethargica, 1; other diseases (non-infectious), 66; not yet diagnosed, 80.

Deaths.—In 126 great towns there was no death from smallpox or scarlet fever, 1 (1) from enteric fever, 36 (0) from whooping-cough, 16 (0) from measles, 27 (1) from diphtheria, 28 (4) from diarrhœa and enteritis under 2 years, and 51 (6) from influenza. The figures in parentheses are those for London itself.

Bournemouth reported a fatal case of enteric fever. Liverpool and Manchester each had 5 deaths from whooping-cough. Liverpool also reported 7 deaths from diphtheria.

The number of stillbirths notified during the week was 213 (corresponding to a rate of 41 per thousand total births), including 14 in London.

Obituary

WILLIAM McDONALD SCOTT

M.D., B.SC. EDIN., D.T.M. & H.

THE death by enemy action of Dr. W. M. Scott, senior medical officer at the Ministry of Health, is an irreparable loss to British bacteriology and to workers in epidemiology and preventive medicine. With him died his friend and colleague, Dr. F. Griffith.

William McDonald Scott was born in Nyasaland in 1884 of Scots parents, and educated at Dumfries Academy and the University of Edinburgh, where he graduated with first-class honours in 1905. In the following year he took the diploma of tropical medicine and hygiene, and as McCunn scholar carried out research work on the conditions affecting the persistence of the typhoid bacillus in contaminated soil in Edinburgh and later in Munich. From 1908–10 he worked as Carnegie scholar at the Royal College of Physicians of Edinburgh on the identification of bacterial species by serological methods, a subject on which he was later to become an acknowledged master. This work led him to study the mechanism of the anaphylactic reaction, and his experiments on this phenomenon furnished its correct explanation. The next two years he spent at Cambridge and at the Pasteur Institute, where he worked with Professor Besredka on the behaviour of trypanosomes in immunity reactions. After sixteen months as government pathologist to the Straits Settlements, he returned to Cambridge in 1913 to teach bacteriology. In 1914 he became medical officer of health to the North-East Kent United Districts, and in 1915 he collaborated with the bacteriologists of the Local Government Board Laboratory in an investigation into the mode of spread of cerebrospinal fever. In 1917 he was appointed to the permanent staff of this laboratory, which became in 1919 the pathological laboratory of the Ministry of Health.

From 1917 till his death Scott carried out bacteriological investigations on a great variety of public-health problems, but he will best be remembered for his work on the salmonella and dysentery groups of bacteria, a province which he made peculiarly his own. He was an official and unofficial court of appeal on the technique and interpretation in laboratory testing of water and sewage, and helped in the preparation of the memorandum issued by the Ministry on the bacteriological examination of water-supplies, in which a standard method of bacteriological testing of water was proposed. He was a member of the preventive medicine committee of the Medical Research Council, the nomenclature committee of the International Association for Microbiology, and he served on the technical committee of the British Standards Institution on scientific glass-ware.

He leaves a widow, four daughters and three sons; his eldest son is serving abroad with the R.A.M.C.

V. D. A. writes: Painstaking and accurate in his methods, resourceful and original in planning experiments, none of Scott's findings has ever been called in question. He had a dry wit, a keen sense of humour and an easy pen, and his writings are models of lucidity and clear thinking. Cool and clear in judgment, his opinions always commanded respect; and, most unassuming of men, he had the gift of making and keeping friends. His promotion to senior medical officer in the newly created laboratory division of the Ministry of Health a week before his death was a well-deserved recognition of his services to bacteriology and public health in the department which he had done so much to build up.

FREDERICK GRIFFITH

M.B. LPOOL, D.P.H.

Dr. F. Griffith, who was Scott's fellow at the Ministry and met his death with him, was born at Hale in Cheshire some sixty years ago. He graduated from the University of Liverpool in 1901 and after holding resident posts at Liverpool Royal Infirmary he was awarded the Alexander fellowship in pathology and worked at the Thompson Yates laboratory. Later he joined as an investigator the Royal Commission on Tuberculosis at Stansted where his brother, the late A. Stanley Griffith, was also working. In 1910 Griffith joined the staff of the Local Government Board under Dr. Arthur Eastwood and began work at Cardinal Manning's old house in Carlisle Place, and like Scott he moved to Dudley House when the Ministry of Health took over the service. Since the outbreak of this war he had been working for the Ministry and the Medical Research Council on investigating streptococci isolated from war wounds and other sources.

Like his brother he was a recluse, known to few. To these, however, his quiet, kindly manner and his devotion to his life job, made him a lovable personality. Outside his work he found his pleasure in his winter ski-ing holiday in the Alps, in walks with his dog on the Sussex downs, and in the cottage he had built there. He was a member of the honourable society of Gray's Inn.

For over thirty years of his working life, writes L. C., Fred Griffith followed a single star. He believed that progress in the epidemiology of infectious diseases would come—and only come—with more precise knowledge about the micro-organisms responsible for those diseases. It was idle to speculate about the sources of infection in tuberculosis or streptococcal infection while there were manifest differences among the strains of tubercle bacilli and of streptococci. Better differentiation of the organisms must come first, and to that task he devoted his life, content quietly to amass observations year after year in the sure hope that some pattern would gradually emerge. Some of us wondered—I certainly often did—whether such complete preoccupation with this one aspect of the problem was worth while. But Griffith was right, as events have proved. His differentiation of the hæmolytic streptococci into types by the agglutination reaction, and that of Mrs. Lancefield into larger groups by the precipitin reaction, have enabled workers all over the world to dig out the essential facts about the sources of infection in scarlet fever, puerperal fever, epidemic sore-throat, surgical sepsis and wound infections. These facts are providing the foundation for far-reaching preventive measures. Griffith knew well that the task was by no means completed but his work had carried it farther than that of any other single individual. A fine achievement, carried through without thought of personal ambition or of gain. He also worked alone at the differentiation of the meningococci and the pneumococci and staphylococci, and here two pieces of work stand out: that on the profound biological changes induced in a virulent pneumococcus by contact with an immune serum, and that on the transformation of pneumococcal types under certain circumstances. It was characteristic that he hesitated longer than most workers would have done before publishing these observations. He always took the line "Almighty God is in no hurry—why should I be?"

A FITTING MEMORIAL

A foreigner, visiting for the first time the laboratory of the Ministry of Health in London, must have been little short of appalled to see how meanly this fundamental activity of a great department of a wealthy country was housed, and must have wondered how, thus cabined and confined, these two world-famed workers managed to exist, let alone function, in such a chaotic environment. But he would not be long there before he knew that they did so because they were Scott and Griffith, who, like C. J. Martin, could do more with a kerosene tin and a primus stove than most men could do with a palace. And if one hesitated to pay the first visit, seeing that it was to a government department, it

was not so the second time. For one found there a compendium of knowledge, a wealth of experience and, above all, a willingness to help, at whatever cost of time and trouble, the like of which could rarely be found anywhere, here or abroad. It did not matter if the visitor were the veriest tyro humbly seeking an introduction to a particular technique, or a senior of repute wishing to discuss some intricacy of public-health bacteriology, all came away impressed and hoping to return. Few public-health bacteriologists in the British Isles do not owe to Griffith and Scott gratitude for help received, some of it acknowledged here and there as a footnote to a paper, yet more unexpressed, but living in the thousand and one details of their daily work. The Ministry of Health may have failed to provide the country with an impressive laboratory or, in peace-time, with an adequate laboratory service; but it did provide two men with an opportunity, which they gladly seized, to help their colleagues in humbler spheres up and down the country. And many of these colleagues will hope, as I do, that in the future there will rise an institution worthy of their memory.—H. D. W.

DUDLEY MACAULAY STONE

M.R.C.S.

St. Bartholomew's Hospital loses a devoted son and one of its premier radiologists in Dudley Stone, whose death occurred on April 15. He was always keen on photography, even as a student, and a number of photographs of members of the staff have been preserved as the result of his activities. He first became interested in radiology when house-surgeon at the Metropolitan Hospital in 1912; in the following year he was clinical assistant in the X-ray department at St. Bart's and had just gone on to Victoria Park Hospital when war broke out and he joined Gordon-Watson on the staff of the Duchess of Westminster's Hospital with which he remained for the duration. On his return he became a chief assistant and ultimately medical officer to the X-ray department at St. Bart's. For some time he was also in charge of the clinical photography department. Beside chest radiography he worked on the X-ray diagnosis of facial lesions with Gillies and of the skull with Cairns. As was then customary he also carried out radiotherapy.

Stone had a very kindly personality; he was never ruffled and his cheerful demeanour was a help to his patients. As a boy he developed a love of the sea and of sailing and this was always the chief of his many hobbies. With a friend he rebuilt an old lifeboat, which subsequently weathered many storms. Later he was part-owner of the *Silver Crescent* and in 1912 was detained with the rest of her crew in the Kiel Canal on a charge of espionage. He was good at many games, but especially at rugger and at water-polo. Having overstrained his heart at the latter he occupied his period of recovery with voyages round the world. Afterwards he designed a boat with an ingenious engine control and a larger model was used in the evacuation of Dunkirk. He was a very keen philatelist and won high awards for his Falkland Islands collection. For many years too he was chairman of the St. Bart's Catering Company.

WILLIAM BRADFORD FOSTER

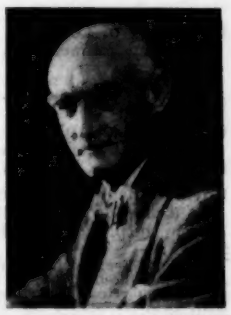
M.B. LOND.; CAPTAIN, R.A.M.C.

Captain W. B. Foster, who died on April 15 at the Middlesex Hospital, was born in San Francisco in 1913, the son of Mr. W. D. Foster. He was educated at St. George's College, Addleston, and at Cranleigh School, Surrey. He qualified M.R.C.S. from St. Bartholomew's Hospital in 1937 and was soon appointed to a resident post at Worthing Hospital. A year later, while acting as senior resident surgical officer at the Kent and Canterbury Hospital, he took his London M.B. He later became assistant medical officer at the Battle Hospital, Reading and early in 1939 he joined the R.A.M.C. But when war broke out he was unable to go abroad, for he had been involved in a motor accident in which he had sustained severe concussion. All through his long and trying illness he studied whenever possible, for he was determined to work for higher qualifications. Captain Foster married, in 1938, Anne Griffith-Jones of Criccieth, who survives him with a young son.

JAMES GRAHAM FORBES

M.D. CAMB., F.R.C.P., D.P.H.

Dr. J. G. Forbes died in the Kent and Sussex Hospital at Tunbridge Wells on April 8. His passing will be mourned by a large circle of the older members of the public health service, especially in London, who knew and respected his sterling qualities and lifelong devotion to duty.



Elliott & Fry

His father and grandfather were both clergymen of the Church of England, the latter being British chaplain in Paris. He was born at Clevedon, Somerset, and went to Clifton College. After a distinguished academic career at Christ's College, Cambridge, and St. Bartholomew's Hospital, he qualified in 1898 and became house physician to that breaker of graven images, Samuel Gee. On leaving hospital he turned to pathology, for which his training and scientific attitude of mind had prepared him. His chief interest was the origin of disease in childhood and he went as clinical pathologist to Gt. Ormond Street. But when the sphere of public health was widened by the establishment of the school medical service Forbes was attracted to it, and he joined the public health department of the London County Council. He worked in 1911 as one of a small band of whole-time assistants under Menzies in the schools of the East End, and when shortly afterwards the divisional system was established throughout London he was promoted to the charge of the South-East division, which is the largest in London. But his heart was still in pathology, and although not unsuccessful as an administrator he seized the opportunity, when the new County Hall was opened with its well-equipped laboratories, to combine the two sides of his work. He joined Brincker at headquarters and was from that time until his retirement engaged in bacteriological work combined with control of infectious diseases in the schools, holding the rank of principal assistant medical officer. He was an early and ardent supporter of the scientific control of diphtheria by preventive inoculation. His sense of duty and missionary zeal in this sphere caused him in 1932 to expand his Milroy lectures of 1929 into a monumental study of the whole subject, and to publish it at considerable cost to himself. As regards prevention, at least, it is almost literally accurate to say that the survey extended from China to Peru. He also carried out a number of original pathological researches, including the study of the floras of school swimming baths, of elementary school class-rooms and of the Underground electric railway.

Some fifteen years before his retirement Forbes underwent a severe operation for gastric trouble which left him more or less of an invalid. He faced his end with the same stoical fortitude which he had shown throughout his life. His sense of the dignity of the profession was very high and never by word or by deed did he deviate by a hair's breadth from the stern path of duty which he had from his student days set before himself.

Dr. Forbes married in 1905 Muriel Watson, daughter of Dr. Watson Paul of Cowes, and leaves a son and two daughters.

ANETHAINE brand of butethanol, a substance chemically allied to procaine, is now manufactured by Glaxo Laboratories. It is ten times more powerful than cocaine, so that a solution of one-tenth the concentration may be used. And in this dilution Anethaine has a lower toxicity than cocaine. It produces effective surface anæsthesia for operative procedures on the eye, nose and throat, and for relief of painful conditions in accessible parts of the body covered with mucous membrane. It is presented as a 2% solution (coloured blue) in 25 c.cm. bottles, and as powder in 1 and 5 g. bottles.

Medical News

University of Cambridge

On April 26 degrees of M.B., B.Chir. were conferred by proxy on F. S. Jackson and T. W. Rowntree.

The late Dr. Charles Slater has left £4000 to the university for teaching or research work in medical science or any science ancillary to medicine at the discretion of the university.

University of London

At recent examinations the following were successful :—

D.P.M.

Helen Baker (with mental diseases-psychiatry).

Part A.—J. W. Affleck, A. A. G. Clarke, Portia G. Holman, and Barbara E. Woodhead.

University of Wales

At a recent examination for the Diploma in Public Health Dr. Nancy G. Rogers was successful in the second part.

Royal College of Physicians of London

At a meeting of the college on April 24, with Sir Charles Wilson, the president, in the chair, the following were elected fellows :—

Stanley Wyard, M.D. Lond. (London) ; John Inkster, M.D. Aberd. (Middlesbrough) ; J. B. Alexander, M.D. Glasg. (London) ; H. S. Pemberton, M.B. Lpool (Liverpool) ; E. G. B. Calvert, M.D. Belf. (London) ; A. W. Hendry, M.D. Aberd. (Aberdeen) ; Montague Maizels, M.D. Lond. (Maidstone) ; T. H. Crozier, M.D. Belf. (Belfast) ; F. A. Knott, M.D. Lond. (London) ; C. J. Fuller, D.M. Oxfd (Exeter) ; C. J. Polson, M.D. Birm. (Leeds) ; Robert Klaber, M.D. Lond. (Bishop's Stortford) ; J. G. E. Hayden, M.B. Melb. (Melbourne) ; R. M. B. Mackenna, M.D. Camb. (Liverpool) ; C. P. Pinckney, M.B. Camb. (London) ; S. P. Meadows, M.D. Lond. (London) ; Andrew Morland, M.D. Lond. (London) ; F. F. Hellier, M.D. Lond. (Leeds) ; L. P. Laurent, M.D. Lond. (Basingstoke) ; Thomas Tennent, M.D. Glasg. (Northampton) ; J. G. Scadding, M.D. Lond. (London) ; N. S. Plummer, M.D. Lond. (Steyning) ; R. W. Fairbrother, M.D. Manc. (Wilmslow) ; Evan Jones, M.D. Lond. (London) ; E. H. Hudson, M.B. Camb. (London) ; M. L. Rosenheim, M.D. Camb. (London) ; Samuel Nevin, M.D. Belf. (London) ; G. W. Goodhart, M.D. Camb. (London) ; G. N. Myers, M.D. Durh. (Cambridge) ; E. F. Scowen, M.D. Lond. (London) ; A. E. Barclay, D.M. Oxfd (Oxford) ; J. F. Brailsford, M.D. Birm. (Birmingham) ; R. M. Gordon, M.D. Dubl. (Liverpool) ; N. G. Harris, M.D. Lond. (London) ; G. C. Anderson, M.D. Edin. (London) ; G. R. Cameron, M.B. Melb. (London) ; Egbert Morland, M.B. Lond. F.R.C.S. (Aylesbury) ; and Major-General H. Marrian Perry, L.R.C.P.I. (London).

The following having satisfied the censors' board were admitted members :—

H. J. Anderson, M.B. Camb. ; D. W. R. Ashby, M.B. Lond. ; C. R. Baxter, M.B. St. And. ; H. W. Fullerton, M.B. Aberd. ; Lilias M. P. Gairdner, M.B. Lond. ; I. M. Hall, M.B. Lond. ; M. R. Hayes, L.R.C.P. ; F. R. G. Heaf, M.D. Camb. ; C. J. C. G. Hodson, M.B. Lond. ; A. L. Jackson, M.B. Camb. ; B. A. E. Johns, M.B. Birm. ; T. A. Kemp, M.B. Camb. ; A. A. G. Lewis, M.B. Lond. ; R. C. Mackeith, D.M. Oxfd ; Maurice Nellen, M.B. Cape Town ; J. W. Paulley, M.B. Lond., R.A.F.M.S. ; John Pemberton, M.D. Lond. ; J. L. Pinniger, B.M. Oxfd ; Mohammed, Sadiq, M.B. Punjab ; D. B. Sen, M.B. Calcutta ; J. R. Squire, M.B. Camb. ; Euodia D. Van Der Walt, M.B. Cape Town ; A. J. Walker, M.B. Lond.

Licences to practise were conferred upon the following 171 candidates (157 men and 14 women) who have passed the final examination of the conjoint board :—

P. H. Abbott, G. C. Acres, R. A. Allen, M. W. Annear, Norah H. R. Armstrong, L. Faibes Barasi, R. F. G. Barker, J. S. Barr, J. L. Battle, J. W., Battram, C. L. F. Beaton R. C. Bell, Wallace Black, P. H. Blackiston, D. V. V. Bowen-Jones, K. G. Bowker, A. C. Boyle, W. Ll. Brace, K. T. Brown, J. E. Bulow, H. C. Burbidge, H. C. Burnell, I. C. Campbell, L. S. Carstairs, Joan Cleland, Betty J. Clymo, R. C. Connolly, P. B. Conroy, Horacio Conte-Mendoza, C. F. Cooper, W. H. Craike, R. McK. Crichton, J. H. Crosland, P. S. Cuthbertson, Raymond Daley, P. G. Daigleish, G. J. L. Davies, H. McI. Davies, B. W. Davy, Thomas Dean, R. M. de Gregory, W. P. Dick, R. G. Dickinson, C. F. Donovan, C. B. B. Downman, C. H. Dunn, J. R. G. Edwards, Margaret Edwards, J. J. Elkesas, Basil Ellenbogen, Franz Fessler, Edmund Finsterbusch, Elizabeth H. Flett, L. P. R. Fourman, H. D. Freeth, Bela Galandauer, R. M. Galvan, L. A. Gibbons, N. W. Gill, Kathleen M. Gillett, Norbert Glas, N. F. C. Gowing, E. A. Gran, Caleb Greenwood-Penny, K. E. A. U. Ground, T. E. Hall, R. C. Hallam, G. J. Hardaker, D. H. C. Hariand, Stanley Harrison, H. G. Helm, G. W. D. Henderson, R. S. Henderson, P. R. Henson, Ebbie Hesselberg, R. D. Hoare, Alan Holmes-Smith, Herbert Howard-Swaffield, H. B. Hyman, J. B. Ingram, C. J. R. Jacob, H. M. Jones, H. H. Khan, R. A. B. Kinloch, H. G. S. Korvin, W. S. S. Ladell S. E. Large, J. B. Latto, R. R. Latto, T. E. Lamb, Brian Lees, E. J. Leighton, H. M. Lewis, D. M. N. Longridge, T. H. McCall, J. G. McGavin, Lydia McMurdo, F. R. L. Makin, C. N. S. Manson, J. K. Martin, L. G. C. Martin, Margaret E. Matthews, J. Le F. Milburn, P. J. Miller, R. A. Moir, B. P. Moore, D. B. Morgan, A. B. Morrison, A. R. V. Moynagh, A. B. S. Mules, A. T. L. Norfolk, N. C. Norman, J. A. Oddie, Thora A. M. Oehlers, K. R. Ogilvie, L. J. Page, K. H. J. B. Parker, T. P. Pattinson, R. H. Percival, C. M. C. Potter, Dorothy P. Potter, B. S. Powell, G. C. Price, G. C. Purslow, P. A. B. Raffle, R. I. Randall, Douglas Ranger, Joseph Reiss, Leslie Rendell-Baker, J. L. Roberts, T. M. C. Roberts, P. J. Robinson, W. J. B. Rogers, M. S. Ross, Basil Rowlatt, F. R. Russell, H. B. L. Russell, J. A. Sadler, R. G. Saipe, R. P. G. Sandon, R. D. W. Schofield, Raphael Sepson, P. C. Sharma, R. M. Sharpe, K. N. Sinha, P. A. J. Smith, R. A. G. Smith, T. H. S. Smith, C. C. Spicer, Walter Spitzer, J. S. Stead, D. E. S. Steele, Harold Sterndale, S. J. Sutton, J. H. Thompson, Edith M. Thorp, J. S. Tomkinson, S. E. Vincent, J. W. Warburton, R. S. Wathes, N. D. Wayne, C. M. Weddell, D. N. White, Mary White, G. L. Whitmore, D. M. Wilkins, Betty M. Williams, John Williams, M. H. Wostenholm, G. B. Wright, and R. B. Wright.

Diplomas in child health were granted to the candidates named in the report of a meeting of the Royal College of Surgeons in our issue of April 26 (p. 556.)

Surgeon Vice-Admiral Sir Reginald Bond was re-elected representative on the Professional Classes Aid Council. Dr. G. E. Ward was appointed external examiner in medicine for the fellowship examination of the Faculty of Radiologists.

Dr. A. W. L. Smith of Sharston, Manchester, has been nominated as an independent candidate in the by-election at King's Norton, Birmingham. Polling will take place on May 8.

On Tuesday, May 13, at 3 P.M., at the section of therapeutics and pharmacology of the Royal Society of Medicine, Prof. J. A. Gunn will deliver the W. E. Dixon lecture. He will speak on the future of pharmacology.

Lord Bessborough has been elected president of the Royal Sanitary Institute in succession to Lord Balfour of Burleigh whose period of office has expired.

The Harveian lecture for 1941 will be delivered by Dr. John Taylor to the Harveian Society of London on Monday, May 5, at 2.30 P.M., at 26, Portland Place, London, W.1. His subject will be The coroner, the doctor, and the public.

Dr. K. W. C. Sinclair-Loutit, medical officer to Finsbury's A.R.P. casualty service, has been appointed M.B.E., and the George medal has been awarded to Dr. H. R. B. Norman, resident assistant physician at St. Thomas's Hospital.

The annual meeting of the Cardiac Society of Great Britain and Ireland was held at Oxford on April 18 under the chairmanship of Dr. A. G. Gibson. Dr. J. B. Herrick (Chicago) and Mr. Frank N. Wilson (Ann Arbor) were elected honorary members, in addition to Dr. Paul White (Boston), elected in 1938. Books and records of William Harvey were on view at Merton College. At the morning session there was a debate on the early signs of cardiovascular disease. In the afternoon the treatment of coronary thrombosis was discussed, especially the period of rest in bed and diet. Original communications, as arranged by the hon. secretary, Dr. Maurice Campbell, included the right pectoral electrocardiogram in auricular fibrillation, the collateral circulation in coarctation of the aorta, the hæmic factor in angina pectoris, the electrocardiogram of the Stokes-Adams attack, and a criticism of the term "chronic myocarditis."

According to the *African World* of Feb. 19 Mr. J. H. Hofmeyr, minister of education for South Africa, has announced that the expansion of non-European hospital accommodation on the Witwatersrand has made it possible to offer facilities there for full medical and dental training to non-European students. In the past these students could not proceed further than the end of their third year at the Witwatersrand University as the teaching hospitals did not permit contact between non-European students and European patients. This concession is a sequel to the work of the committee appointed in 1937 to investigate and report on medical training in South Africa.

Steady progress in the fight against disease is being achieved among the Western Pacific Islands by native medical practitioners trained at the Central Medical School, Suva, Fiji, and it is hoped that the school will become the recognised medical training centre for the Pacific Islands. Founded by the government of Fiji as an integral part of the native medical practitioner service, it became the central medical school in 1928 when it was enlarged and extended with help from the government of Fiji and the International Health Division of the Rockefeller Foundation. Students come to the school from Fiji, Western Samoa, the British Solomon Islands, the Gilbert and Ellice Islands, Nauru, Tonga, the Cook Islands, the Rotuma Dependency, the Anglo-French Condominium of the New Hebrides, and American Samoa. It is hoped to bring Pitcairn Island within the scope of the school's activities. The course of training extends over four years, and graduates receive a diploma which entitles them to practise medicine and surgery only in these territories. The school seeks to preserve the native character of its graduates in order that they may be more readily accepted in the native social system. All the students live at a hostel which accommodates 40 undergraduates. Postgraduate courses are also held at the school.

Notes, Comments and Abstracts

NEW SCOPE FOR THE ALMONER[1]

BY MARGARET W. EDMINSON
ALMONER TO THE PETO PLACE CLINIC FOR RHEUMATISM

HOSPITAL almoners have been in existence since 1895, and most of our present working almoners were not born when Miss Mary Stewart was first appointed to the Royal Free Hospital. Sir Charles Loch, secretary of the Charity Organisation Society, was founder of the profession. It was he who first recognised as early as 1885 the need for some kind of social service within the hospitals. The problem confronting the governing boards of the hospitals was at that time an administrative one connected with the overcrowding of the outpatient departments. Sir Charles was convinced that trained social workers should be appointed to provide a link between the treatment that was given in the outpatient department and the outside sources of medical and social aid. When Miss Stewart, as a result of his representations to the governing board of the Royal Free, was appointed the first almoner the three main duties laid down for her were: to prevent abuse of the hospital by persons able to pay for medical treatment; to refer patients already in receipt of parish relief and such as are destitute to the Poor Law authorities; and to recommend suitable persons to join provident dispensaries.

It would be interesting to know how far the hospital committee (whose initial motive in appointing Miss Stewart was to keep down numbers) realised the significance of the duties they assigned to the newcomer. Some must have been influenced by the ideas of Sir Charles Loch, for the minutes of the board contained an additional statement: "that we have no machinery by which cases of needy and deserving patients can be followed up after treatment. It must frequently happen that a few weeks change and rest with good food at the seaside or country would save a valuable life, and there are various societies willing to help such cases, if their attention is drawn to them." There, surely, was the idea of medical social service, but hidden, as a negative statement, in the minute book. During the following ten years seven other hospital boards followed the example set by the Royal Free Hospital, and in 1903 the eight pioneer almoners joined together in a small committee "to discuss the possibilities and difficulties of their work." I like to think of that small group meeting round the fireside in their own homes and thrashing out the groundwork of the present Hospital Almoners' Association.

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The 1913 report of the almoners department of the Royal Free mentions 488 patients sent to convalescent homes, 108 supplied with surgical appliances and 54 helped with other forms of relief such as clothing and "cabfares." The board could no longer regret that they had "no machinery" for aftercare, for arranging convalescence, or providing extra nourishment and surgical boots and belts. This report, like others of the same period, is a milestone for it deals with the effects of the new National Health Insurance Act on hospital administration and shows how the almoner became at once the interpreter of the scheme. Where difficulties confronted the patients who wished to claim benefits or where there was ignorance as to the benefits to which they were entitled, she advised. In all cases where an insured patient was found not to require hospital treatment, directions as to how to use the services of a panel doctor were given to those who were not already on a panel doctor's list. The governing bodies of hospitals also decided that the almoners were the proper officers to administer Samaritan funds. Hospital policy was formulated on statistics supplied by the almoner concerning insured persons, members of approved societies and matters relating to public authorities; and many almoners, by their knowledge of funds available outside the hospital, were able to save Samaritan funds from being burdened by unnecessary inroads. There is a triumphant year in the annals of St. Thomas's at about this time when the Samaritan fund was free of debt, for, as the almoner reported, "during the year many approved societies paid the whole cost of convalescence and instruments for the members, a source of help practically unknown before."

In 1914 it was feared that the effect of war on hospital finance might lessen the number of appointments, curtail posts already in existence and bring an end to our struggling youth. Actually the work of the departments, in spite of reduced number of patients, did not decrease; there was a dearth of almoners to carry on, and a lack of applications from students for training. The various war pensions committees and soldiers and sailors families' associations, called into being at that time, increased the importance of record keeping and accurate case work. The almoner was also doing valuable work in maternity and child welfare departments organising home visiting and helping to raise the standards of personal hygiene and cleanliness in the homes of those who applied to the hospitals for their confinements. Children's care committees were being formed at this time, and an interchange of social and medical reports between care committee workers and almoners resulted in effective care of each individual child. There was similar close coöperation between tuberculosis officers, health visitors and almoners in tuberculosis hospitals. One would have expected to see a similar increase in the work done in V.D. departments, but even now there is reluctance to call in the help of a social service worker in these clinics. The possibilities there are such that one wonders why progress in this direction has been so slow.

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After the war some hospitals appointed almoners to help to increase the financial income of the hospital, and many of those appointed felt heartburnings because they realised that work of this kind was a side issue of their main function. They felt they were not really called to stop abuse or to collect payments; they were called to serve the patients and to coöperate in the fight against disease, and it is interesting to note that, once appointed, these almoners gave, alongside their administrative work, the benefits of their social service experience until the true value of their team work in the cure and prevention of disease was fully recognised.

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Now the pages of the scrap book turn to 1939. From the point of view of a London almoner the months following September were black. Wholesale evacuation took place; doctors, patients and hospitals were scattered, organisations left London, departments closed down, chronic and incurable and mentally unstable patients were removed to outlying districts, or sent home to sometimes utterly unsuitable circumstances, patients suffering from tuberculous conditions (actively infectious) were discharged from hospitals to overcrowded homes, patients with early and operable carcinoma were unable to gain admission, children requiring regular supervision month by month in orthopædic departments were evacuated to districts where no orthopædic service existed, others suffering with open sores were billeted in the homes of healthy families. Many almoners were thrown out of work and many of us were challenged by the thought: "How had medical social service failed so that at this supreme crisis in the nation's history no single almoner had been invited to help to plan for the emergency that for months previously had been foreseen by the Government?" Those who retained their jobs strove hard to alleviate the suffering of the patients by whatever means they could devise; and gradually as the months passed and London was not attacked, and as the Emergency Medical Service came slowly and painfully into gear, the profession seemed to emerge from that first shock and to get to grips with the problems.

* * *

At the beginning of the war there were about 50 almoners out of work—now there are practically none. The pendulum has swung from left to right. We are witnessing in London a revolution in our work. For instance, the head almoner of a large voluntary hospital finds her assistants transferred as almoners to base

1. Extracts from an address delivered at the annual meeting of hospital almoners on April 25.

hospitals in the home counties. They share their patients, they share their problems and they share their records. No longer must the almoner think in terms of a single unit, but in terms of a region. She no longer only serves her local district, but she serves her sector. At the end of 1939 the Ministry of Health notified all hospital authorities responsible for administering the Emergency Medical Service scheme that arrangements should be made for the appointment of an almoner, and that the Minister would be prepared to recognise the salary of an almoner as properly incurred under the emergency scheme. There was not a very large response to this circular at first. Quite a number of for instance the county council authorities had their own officer for collecting payments, but in several cases an almoner was appointed for administrative reasons.

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When, in the summer of 1940, the bombing of London began, there was a second evacuation and all the problems associated with large groups of homeless people called for immediate attention. The situation now arose when the parent hospital overnight received perhaps 50 civilian air-raid casualties and, in anticipation of further numbers during the next night, sent 30 or so of these by motor convoy to a base hospital next day. Some of these had only the clothes they stood up in, and had no homes to return to. Some had lost children or husbands and did not know whether these were alive or dead. Others had had their means of livelihood destroyed. These arrived at the base hospital with varying degrees of injury and a host of unresolved social problems. Within less than four months from the date when the "blitz" started, the Minister of Health circulated a clear and strongly worded letter to all the authorities in charge of Emergency Medical Service hospitals advising at once the employment of trained almoners for social service reasons. This letter was, in my opinion, the most important milestone in our story. The idea that was in the mind of Sir Charles Loch, and incorporated in 1895 as a negative statement in the minute books of the Royal Free Hospital, had at last come to fulfilment; last year the social welfare and after-care of patients was recognised as the essential reason for the appointment of trained almoners in all hospitals by the Government authority responsible for the health of the nation.

As a result of this circular, there has been a great increase of almoners' posts in many counties. The speed with which at the moment vacancies in new posts are developing might almost be called alarming. Last year 30 new posts were filled; in the first ten weeks of this year 21 new vacancies have occurred, and at this rate (which, if constant, would be over 100 a year) one wonders whether the amazing opportunity with which we are faced can possibly be met. Some of these new posts are of outstanding responsibility. The chief medical officer of health and chief public assistance officer of one county have appointed an almoner who is to be responsible for the whole county. This is significant. Surely the regional medical officer, and the sector officer and the sector matron, should be joined by a sector almoner. The country now is growing regionally minded, and we must not lag behind. Could we, to take up one challenge, develop within the next five years a standardisation of our records? So that when the Ministry of Health of 1946 calls on us to produce material from social service departments in half a dozen sectors on certain factors relating to a particular disease, we could at once be in a position to compile and produce results. Having become regionally minded, can we meet the widespread need to supply almoners of quality and in quantity? The Institute has resisted the temptation to increase numbers of students by lowering and shortening the standards of training, for it is realised that the quality of our work is of major importance. We want almoners with good brains and of high courage and above all, those who are aware of human frailities and able to understand personal difficulties and relationships. It may be that sacrifices will be demanded of heads of departments to free assistants to move on to key positions and that personal wishes will have to give way before professional claims. For if we fail now, shall we ever have such a chance again?

Appointments

BARNES, FRANCES M., M.B. Lond.: temp. M.O. (maternity and child welfare) for Birmingham.

COOK, EWART, M.R.C.S.: resident orthopædic officer at the Grimsby and District Hospital.

HENDERSON, BLANCHE, M.B. Lond.: asst. R.M.O. at Alverstoke Hospital, Gosport.

JOHNSON, H. D., M.B. Camb., F.R.C.S.: first surgical registrar at St. Thomas's Hospital, London.

KELLY, P. M., B.Chir. Camb., F.R.C.S.: second surgical registrar at St. Thomas's Hospital, London.

PENWILL, MARJORIE L., M.B. Lond.: temp. M.O. (maternity and child welfare) for Birmingham.

Births, Marriages and Deaths

BIRTHS

ABERNETHY.—On April 25, at Oxford, the wife of Mr. Douglas Abernethy, F.R.C.S.E.—a daughter.

BISHOP.—On April 20, at Sawston, Cambs, the wife of Dr. P. M. F. Bishop, of the Warden's House, Guy's Hospital—a daughter.

COGAN.—On April 28, at Southborough, Kent, the wife of Dr. John Cogan—a son.

DURBIN.—On April 29, at Theydon Bois, Essex, the wife of Major F. C. Durbin, R.A.M.C.—a son.

FLOCKTON.—On April 25, at Dublin, the wife of Captain Peter Flockton, R.A.M.C.—a son.

GROSE.—On April 25 and April 26, the wife of Dr. G. N. Grose, of Stanmore—twins, a girl and a boy.

JAMESON EVANS.—On April 24, at Lower Bourne, Farnham, the wife of Dr. T. C. Jameson Evans—a son.

METCALF.—On April 24, at Wimbledon Hill, S.W.19, the wife of Dr. James Metcalf—a daughter.

NEEDHAM.—On April 23, at Malpas, Cheshire, the wife of Lieutenant E. J. A. Needham, R.A.M.C.—a son.

RAMSAY.—On April 28, at Salisbury, the wife of Dr. Hugh Ramsay—a daughter.

SHEPHERD.—On April 25, the wife of Dr. G. A. Shepherd, Chase Side, Southgate, N.14—a son.

SMITH.—On April 27, at Stourport, the wife of Dr. J. A. Smith of Bromsgrove—a daughter.

STREET.—On April 18, at Bedford, the wife of Captain W. J. Street, R.A.M.C.—a daughter.

WATTS.—On April 20, at Oxford, the wife of Captain H. Price Watts, R.A.M.C.—a son.

MARRIAGES

CRUTCHLOW—PAGE.—On April 21, at Kensington, Everett Francis Crutchlow, surgeon lieutenant R.C.N.V.R., to Bridget Wendy Page.

EVE—WOOLNER.—On April 16, at Bagborough, Somerset, Ivor Stuart Eve, M.R.C.S., lieutenant R.A.M.C., to Stella Lucy Woolner.

MCVICKER—MIDDLETON.—On April 23, at Newton Valence, Daniel McVicker, M.B., lieut.-colonel R.A.M.C., to Ruth Vera Middleton.

SILK—WESLEY.—On April 16, at Aldwick, Sussex, the Reverend Claude Whitehall Silk, M.D., to Frances Wesley.

TEMPLE—LEIGHTON.—On April 21, at Norwich, John Lloyd Temple, M.B., surgeon lieutenant R.N.V.R., of Beckenham, to Charlotte Mary Leighton.

TIERNEY—EVETTS.—On April 24, at Londonderry, Richard Barton Holme Tierney, M.R.C.S., surgeon lieutenant R.N.V.R., to Margaret Evetts.

DEATHS

ANDREW.—On April 20, at Dulverton, Somerset, George William Macbeath Andrew, B.A. Camb., M.R.C.S.

BEDDARD.—On April 27, at Ringwood, William Oliver Beddard, M.D. Durh., barrister-at-law of the Middle Temple.

BUNCH.—On April 22, at Teignmouth, John Le Mare Bunch, M.D., D.Sc. Lond., M.R.C.P.

HAVELL.—On April 24, at Langham, near Bury St. Edmunds, Charles Graham Havell, M.D. Durh., of Felixstowe, aged 83.

MILLAR.—On April 20, Ramsay Millar, M.B. Glasg., D.P.H., of Darton Hall, near Barnsley, aged 65.

PRINGLE.—On April 24, at Whiteflat, Killcarn, Stirlingshire, James Hogarth Pringle, M.B. Edin., F.R.C.S.

SALWEY.—In April, by enemy action, James Salwey, M.R.C.S., aged 24.

SIMPSON.—On April 27, George Maxwell Simpson, M.D. Brux., M.R.C.S., of Upper Brook Street, London, W.

TROWER.—On April 27, at St. Leonards-on-Sea, Arthur Trower, M.R.C.S., aged 81.

BURROUGHS WELLCOME AND CO. are now making their Tabloid Ammonium Chloride in a combined special coating and sugar coating which remains unaffected by the acid media of the stomach for from 3–4 hours, but breaks down in the alkaline media of the small intestine. Local irritation to the stomach lining is thus prevented by large doses of ammonium chloride.

BRITISH DRUG HOUSES have issued tablets of vitamin C for infants, each tablet containing 5 mg. of ascorbic acid, roughly the equivalent of two teaspoonfuls of orange juice. The tablets dissolve readily in warm milk or in the infant's feed. For adults and the treatment of severe deficiencies tablets containing 25 or 50 mg. are available.